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ABSTRACT

This thesis investigated the effects of adding the learning of American Sign Language (ASL) signs (as part of the Applied Behavior Analysis) on the negative behaviors of seven developmentally disabled children (aged 8-13 years). The children were measured on the following: overall disruptive behavior; aggressive behavior; tantrums; and the use of ASL signs over the course of 20 consecutive school days (10 days for the establishment of the baseline, 10 days for the study of the intervention). Results on these measures failed to provide support for the efficacy of ASL signs. Qualitative observations, however, did lend support for the use of the intervention. The lack of quantitative findings is explained by the fact that signs were being implemented before the baseline period and that most of the dramatic treatment gains had been obtained before the baseline measurements were completed. Although the study did not provide hard evidence for the efficacy of using ASL with the developmentally disabled population, there was enough anecdotal evidence to consider applying this intervention. The advantage of ASL is that even if it is not effective, the iatrogenic effects of using it are minimal at most. The findings from this study suggest that caretakers who take the time to implement ASL signs into the behavioral repertoire of developmentally disabled children will see dramatic improvements in the child's behavior. Two appendices containing behavior rating scales and 78 references are included. (KFT)

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THE ROLE OF AMERICAN SIGN LANGUAGE IN IMPROVING BEHAVIORAL FUNCTIONING IN DEVELOPMENTALLY DELAYED CHILDREN WITH COMMUNICATION DISORDERS

By:

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In

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Abstract

This investigation examined the effects of adding learning American Sign Language (ASL) signs to Applied Behavior Analysis (ABA) on the negative behaviors of seven 8- to 13-years-old developmentally disabled children. Children were measured on (a) overall disruptive behavior, (b) aggressive behavior, (c) tantrumming, and (d) the use of the ASL signs over the course of 20 consecutive school days (10 days for baseline, 10 days for intervention). Results on these measures failed to provide support for the efficacy of ASL signs. Qualitative observations, however, did lend support for the use of the intervention. The lack of quantitative findings is explained by the fact that signs were being implemented before the baseline period and that the most dramatic treatment gains had been obtained before the baseline measurements. Directions for future research and implications for these results are presented.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

Introduction

Children with developmental disabilities present challenges in managing their behavior. Tantrums, often resulting in injuries to themselves and others, are very common among these children. Behavioral interventions are at present considered the "gold standard" in the management of developmentally disabled children. Behavioral interventions, such as Applied Behavioral Analysis (ABA), that apply the principles of operant conditioning are implemented in many school and aftercare settings that serve this population. The widespread use of these strategies mainly stem from their high level of success. Despite the success of behavioral interventions like ABA, these interventions rarely claim complete success in managing behavior.

In trying to improve developmentally disabled children's behavioral problems, their disruptive behaviors must be understood from a functional perspective. The present investigation proposes that, within developmentally disabled children whose disorder represents a disorder of communication (e.g., autism), these problematic behaviors frequently result as a function of the inability of these individuals to effectively communicate their wants and needs. Because these children have limited means by which to

communicate their needs effectively, the use of behavioral interventions will not completely reduce their problematic behaviors. Rather, it would be expected that language mediation would accomplish further behavioral improvements by reducing the need for disruptive behavior.

The most practical mechanism by which language mediation could occur within a population of children with limited cognitive and verbal capacities would be through the use of sign language, such as the American Sign Language system. Although sign language is predominantly used with deaf and hard of hearing populations, the applicability to children who have difficulties with communication warrants investigation given that few studies have examined this issue.

The following literature review will summarize the empirical and theoretical literature that supports the proposition that teaching developmentally disabled, communication disordered children sign language could potentially reduce their behavioral problems. This review begins with a summary of the literature pertaining to language development followed by a summary of the literature on communication disorders. Next, the review summarizes the literature on non-signing and signing language intervention approaches. Following this discussion, the literature pertaining to the behavioral interventions commonly used with these children, including Applied Behavioral Analysis and functional assessment, will be discussed. Because teachers

will apply the ASL intervention, this review will conclude by discussing the literature on teacher resistance to change.

Literature Review

Language Development

Prior to the last several decades, it was believed that the primary factor in the learning of a language was the process of imitation. Language was seen as developing by gradual increments with the parents playing a central role by providing model and shaping grammatical utterances by means of selective reinforcement. The operant conditioning model was invoked to explain all verbal behavior, and the Stimulus-Response (S-R) paradigm was of paramount importance (Skinner, 1953, 1957). The change in emphasis in the study of child language can be traced in large part to the investigations of the child's understanding of English morphology, emphasizing the ability of children to apply generalized rules to words never encountered before (Brown, 1973). The most significant finding produced by psycholinguistics has been the evidence that language does not develop gradually in a child solely by means of parental selective reinforcement. The child makes great inductive leaps to acquire grammatical proficiency within an amazingly short period of time. Language is not a passive process as has been assumed. A child learns language by interacting with it, by actively coping with and manipulating the environment. The structures of language at the earliest most primitive levels are similar for all children no matter what language their parents speak

(McNeill, 1965).

Chomsky (1957) most notably espoused this view. Instead of emphasizing behavioral explanations, Chomsky emphasized the importance of grammar and syntax in explaining language, which he believed was based on a system of rules. He proposed that semantics and syntax were independent from each other and represented two levels of language: a deep structure that imparts meaning and a surface structure that provides the phonetic representation. According to Chomsky, every human being has an innate ability to acquire language and this ability is activated when one hears language for the first time. His concept of transformational-generative grammar made it possible to predict sentence combinations in any language and to describe their structure.

From this view, proper language development calls for the mother to provide good, clear grammatical forms for the child to imitate. This enables the child to express him- or herself in a manner understandable to the mother, thereby allowing her to provide expansions. Thus, language competency lies in the deep structure, in the ability to generate novel yet appropriate utterances on the basis of a limited vocabulary, and knowledge of the rules of the language.

A child may make mistakes (e.g., "runned", "foots", "goed") in terms of adult language, but these mistakes are indications of an ability to apply rules or generalizations systematically to language and are usually quickly eliminated. It is very common for young children to be

considered grammatically competent if they demonstrate an understanding of the morphological and syntactic structure of their language. On the other hand, it is not possible for an adult to possess a relatively large number of nouns and verbs in his or her repertoire, but still be considered grammatically or linguistically retarded because of the inability to use words in proper order or to reproduce the correct morphological form (Moores, 1997). Although nouns and verbs comprise a bulk of an adult's vocabulary, they are not the most commonly used words in a language.

Nouns and verbs, the content words of English, are relatively less important than interstitials (e.g., articles [a, an, the], conjunctions [and, but, or], prepositions [to, for, among], and pronouns [he, her, their]), which are the words that establish the structure of a language, are relatively in small number in the English language, and are mastered quiet rapidly. Obviously, a person who did not have control over the interstitials of a language would be severely limited in the understanding of messages, no matter how large the vocabulary.

Before discussing language development in children who have a communication disorder, such as autism and/or mental retardation, it is necessary to understand the connection between cognition and language.

Thought and Language

Vygotsky (1962) is the principal contributor to our understanding regarding the connection between thought and

language. Vygotsky concluded that, although studies of apes showed that thought and speech developed differently and functioned separately, in human beings there was a close correspondence. However, because the relationship between thought and speech is ever changing, their progress does not run parallel. A pre-linguistic phase in the development of both thought and speech can be observed. Vygotsky cited an example in a study by Koehler and Buehler of the pre-linguistic phase in the development of speech. This pre-linguistic phase included a child's babbling, crying, and first words, called the "chimpanzoid age" because the behaviors are related to the development of speech but not to the development of thinking.

According to Vygotsky, before two years of age, the development of thought and speech are separate. They blend at two years to become a new form. Thought becomes verbal and speech becomes rational. Speech serves the intellect as thoughts are spoken. The social environment is important to children's development because it can accelerate or decelerate development (Vygotsky, 1962).

In discussing the nature of thought and language, Vygotsky and other theorists emphasized the various functions of language. According to Moll (1990), language is a tool for organizing thinking because it bears the concepts. Vygotsky (1962) claimed that the primary function of language is communication. Communicative and egocentric speech are both social with primary functions. According to Vygotsky,

speech develops first with external communicative/social speech, then egocentric speech, and finally inner speech.

Contrary to Piaget's beliefs, Vygotsky theorized that the structural and functional qualities of egocentric speech develop into speech that is different from external, social speech. Egocentric speech develops and evolves into inner speech. According to Vygotsky, egocentric speech is the transition from the social activity of children to a more individualized activity. It is connected to the children's thinking because it helps them overcome difficulties. At the beginning of its development, egocentric speech is identical in structure to social speech. As egocentric speech transforms, it appears disconnected and incomplete. When the characteristics of egocentric speech that are similar to social speech are eliminated, egocentric speech drops. Vocalization becomes unnecessary because the child "thinks" the words instead of pronouncing them. Vygotsky theorized that egocentric speech has a genetic connection with inner speech. Egocentric and inner speech, both fulfill intellectual functions and have similar structures. Inner speech is for oneself, while external, social speech is for others (Vygotsky, 1962).

Vygotsky (1962) asserted that thought development is determined by language and that individuals regulate their own cognitive functions via actively constructing knowledge and meaning through mental manipulation and self-organization of experience. In his view, this restructuring of an

individual's psychological process enables a child to master his or her environment. Self-regulation is a cornerstone of Vygotsky's theory. Self-regulation is a generally believed to be an executive function that individuals use to monitor and direct mental processes in order to obtain successful performance (Singer & Bashir, 1999). According to Vygotsky, private speech (i.e., speech that is spoken aloud without a social purpose) facilitates self-regulation in that it helps connect language and thought. This position has been empirically supported (e.g., Berk & Landau, 1993).

There are stages that children pass through to develop thinking. First, they think in terms of complexes, or concrete groupings of objects connected by facts. Children form complexes when they unite diverse objects in groups with a common family name. In that case, children are using words as names. The object complexes are linked in the child's mind based on impressions and bonds that already exist between the objects. Children must pass through developmental stages of complexes before they form a concept. According to Vygotsky (1962), the presence of linking an object with a word is not sufficient evidence of concept attainment. He found that the word is the sign at the beginning of concept formation. The word eventually becomes the symbol of that concept. There is also a discrepancy between the ability to form concepts and identify them. Abstract concepts can be explained with concrete terms and examples. Vygotsky (1962) asserted that this is not sufficient evidence that a concept has been

formed. Vygotsky observed that the ascent to concept formation follows phases with sub-stages. True concepts begin to be formed with increasing fluency.

Vygotsky (1962) classified concepts as either scientific or spontaneous. Spontaneous concepts are nonconscious, whereas scientific concepts are those taught in school. Vygotsky found that as long as curriculum supplies the necessary material, the development of scientific concepts runs ahead of the development of spontaneous concepts. This is because scientific concepts are formed in the process of instruction in collaboration with an adult. Also, children develop reflective consciousness through the development of scientific concepts. Furthermore, mastering a higher level in the realm of scientific concepts raises the level of spontaneous concepts. Scientific concepts, or schooled concepts, are learned through written symbols, where spontaneous concepts are learned from sensory experience to generalization (Tharpe & Gallimore, 1988). According to Tharpe and Gallimore (1988), it is essential that an interface between spontaneous and the schooled concepts be provided during instruction. This is where the highest understanding is achieved.

According to Vygotsky (1962) development depends on learning, but learning is not dependent on development. Effective instruction can further development and influence development of higher functions. Quality instruction leads development and bridges the student's current skill level

with their potential skill level. Knowledge within a discipline is important, but solving problems that encourage students to go beyond their current skill and knowledge level is critical to effective instruction. Instruction should provide opportunities for solving dilemmas (Driscoll, 1994).

According to Vygotsky, given that instruction should precede development, the requisite functions are immature when instruction begins. The discrepancy between children's actual mental age and the level they reach in solving problems with assistance is the Zone of Proximal Development (ZPD). There is no single ZPD for individuals, because the zone varies with culture, society, and experience. Vygotsky (1962) claimed that the larger the zone, the better students will learn in school. For a ZPD to be created, there must be joint activity that creates a context for student and expert interaction. The expert may then use multiple instructional strategies. Social interaction is important because the expert can model the appropriate solution, assist in finding the solution, and monitor the student's progress (Tharpe & Gallimore, 1988). Vygotsky (1962) believed that partners should jointly solve problems to bring about cognitive development.

In view of the importance of language for the development of higher mental processing, the consequences of communication disorders for cognition will next be addressed.

Communication Disorders

Communication and language-related disorders affect several million children in the United States and are the single most common reason for special education referral (Casby, 1989). Early communication and language problems are often implicated as contributing factors in later appearing learning disabilities and behavior disorders (Fey, Catts, & Larrivee, 1995; Kaiser & Hester, 1997).

Individuals with the most severe disabilities are distributed along a continuum of great breadth with respect to their social competence. At one extreme are people who have substantial behavioral repertoires that are aimed at a variety of communicative purposes. For some of these persons, challenging forms of social behavior may include, but not be limited to, tantrums, aggression, property destruction, and self-injury (Durand, 1990). Others with severe disabilities may have a significant repertoire of social skills that consist of conventional and/or extremely unconventional symbols that may be understood only by persons who are acquainted with the individual. Others with severe disabilities appear to have little interest in social exchanges. These individuals are passive participants in the milieu of social opportunities. Their passivity can be interpreted as (a) having interaction strategies without choosing to use them, (b) having learned to refrain from social contact as a result of learned helplessness, (c) having experienced social contact as an aversive event that

results in the active avoidance of social interactions, (d) having limitations in their ability to discriminate and react to social stimuli, and/or (e) having limitations in their ability to remain sufficiently alert to the social environment (Guess, Benson, & Siegel-Causey, 1985).

Among individuals with severe disabilities who use communication functions, evidence suggests that speaking partners often fail to respond (Wetherby, Reichle, & Pierce, in press). A prime source of communication breakdowns involves the use of symbols that are too idiosyncratic to be understood easily and too time-consuming to produce a "realtime" interaction with a verbal conventional partner (Reichle, Halle & Drasgow, in press). For example, persons with autism have a propensity for using a substantially greater proportion of requests for objects and actions than comments or other communicative functions. Consequently, selecting a communication means (mode) that will be maximally efficient for both speaker and listener is critically important.

Developing children typically utilize somewhat comparable proportions of comments and requests. Beginning communicators develop gestural and vocal communicative acts that share somewhat equal prominence. After their first birthday, communicative acts begin to disproportionately acquire significantly more new vocal approximations than new gestures. They supplement existing gestures with vocal utterances.

Some individuals do not learn from naturally occurring opportunities in the milieu of their natural environment. According to a number of investigations, children's development of representational play has a significant impact on the development of early representation communication. Unfortunately, individuals with severe disabilities have far fewer opportunities to engage in social play than their typically developing counterparts (Reichle, York, & Sigafoos, 1991). Given significantly diminished opportunities in early play and literacy, individuals with severe disabilities may have less practice in utilizing more subtle cues presented in a range of natural environments.

Emerging evidence suggests that although adults interacting with developing children are, for the most part, highly responsive to children's utterances, this may not necessarily be the case for persons with severe disabilities (Miller & Paul, 1994). Communication involves an interaction between two or more individuals in which speakers and listeners influence each other's behaviors. Maintaining an interaction entails reacting to and subsequently maintaining social interaction. The learner must be able to attend to referents of the speaker. A social exchange is a joint focus that refers to both participants directing their attention simultaneously to the same referent. Engaging in joint focus promotes participation in joint activity that allows children to learn roles in the context of social scripts. When children with communication disorders begin to use

communicative utterances that are separated from an acquisition context, they are increasingly likely to be misunderstood (Miller & Paul, 1994).

Kaczmarek (1990) suggested that in order to initiate a communicative exchange, a speaker must select a listener, establish proximity to a listener, and obtain the listener's attention. Subsequently, the message can be delivered. Many individuals with disabilities fail to initiate interactions because their repertoire of skills that occur prior to actually producing a message is insufficient. Their passivity may be the product of learned helplessness (Reichle York, & Sigafoos, 1991). Individuals with severe disabilities learn that even though they do not initiate communication, other persons often seek them out to deliver goods, services, or bids to participate. Thus, with no effort, individuals with severe disabilities may receive sufficient attention to make it worthwhile to continue to refrain from initiating social interactions (Guess, Siegel-Causey, & Benson, 1985). This phenomenon may be further reinforced when, as often happens, people with severe disabilities receive no immediate response even if they do initiate communicative utterances. As a result, they may learn that initiating communicative utterances has limited effects.

Although there are many developmental disorders that are associated with a disorder of communication, autism spectrum disorders best typify developmental disorders where communication is severely affected. Another example of this

relationship can be seen in individuals with mental retardation in that their impaired mental functioning makes communication more difficult. Because autism and mental retardation were the fulcrum of the present investigation, a review of each is in order.

Autism

The fourth edition of the Diagnostic and Statistical Manual (DSM-IV; American Psychiatric Association, 1994) characterizes the essential features of Autistic Disorder as the presence of markedly abnormal or impaired development in social interaction and communication and a markedly restricted repertoire of activities and interests. Manifestations of the disorder vary greatly depending on the developmental level and chronological age of the individual. The impairment in reciprocal social interaction is gross and sustained. There may be marked impairment in the use of multiple nonverbal behaviors (e.g., eye-to-eye gaze, facial expression, body postures and gestures) to regulate social interaction and communication (Criterion A1a). There may be failure to develop peer relationships appropriate to developmental level that may take different forms at different ages. Younger individuals may have little or no interest in establishing friendships. There may be a lack of spontaneous seeking to share enjoyment, interests, or achievements with either people (e.g., not showing, bringing, or pointing to objects they find interesting). Lack of social or emotional reciprocity may be present. Often an

individual's awareness of others is markedly impaired. Individuals with this disorder may be oblivious to other children (including siblings), may have no concept of the needs of others, or may not notice another person's distress.

The impairment in communication is also marked and sustained and affects both verbal and nonverbal skills. There may be a delay in, or total lack of, the development of spoken language. In individuals who do speak, there may be marked impairment in the ability to initiate or sustain a conversation with others, or a stereotyped and repetitive use of language or idiosyncratic language. When speech does develop, the pitch, intonation, rate, rhythm, or stress may be abnormal. Grammatical structures are often immature and include stereotyped and repetitive use of language or metaphorical language. A disturbance in the comprehension of language may be evidenced by an inability to understand simple questions, directions, or jokes (American Psychiatric Association, 1994).

Autism was first recognized by the pioneers Leo Kanner (1943) and Hans Asperger (1944), who independently published accounts of this disorder. Both authorities believed that there was present from birth a fundamental disturbance that gave rise to highly characteristic problems. The word "autistic", which characterizes the nature of the underlying disturbance, was first introduced by the eminent psychiatrist Eugene Bleuler in 1911. It originally referred to a basic disturbance of schizophrenia, which is the narrowing of

relationships to people and to the outside world, a narrowing so extreme that it seemed to exclude everything except the person's own self. This narrowing could be described as a withdrawal from the fabric of social life into the self. Hence the words autistic and autism from the Greek word "autos", meaning "self".

Another cardinal feature is obsessive insistence of sameness, which involves several factors: repetitiveness, rigidity, single-mindedness, pedantry, and inability to judge the significance of subtle differences. There are simple repetitive movements, utterances, thoughts, and the uniquely elaborate routines, demonstrated in actions, language or thought, without apparent purpose. In addition, there is the pursuit of extremely narrow topics of interest, a preoccupation to the exclusion of almost everything else.

The disturbance of communication in Autism is at once gross and subtle. This can best be explained by imagining that there are two kinds of communication. One kind is of highest priority in normal individuals, and this has the special status of fully intentional communication. It relates information to mental states and evaluates information that is conveyed. The other kind applies just to the conveying of bare messages. Faithful conveying of information is not a trivial accomplishment. It calls for accurate encoding and decoding of speech at input and output stages. Echolalic children do it. Nevertheless, in everyday communication one rarely expects that a listener will have to receive and then

transmit a bare message as an exact copy. On the contrary, one expects listeners to know that messages are not bare, but usually contain something more. What really matters in everyday communication is the point of the message rather than the message itself. It is pervasively documented that autistic individuals cannot easily understand language that is flippant or witty, and that instead they are excessively literal (Filipek, Accardo, & Baranek, 1999). As a consequence, the many tools that allow communication to develop to a highly sophisticated level are not mastered.

Mental Retardation

The DSM-IV (American Psychiatric Association, 1994) characterizes mental retardation by three criteria. First, there must be significantly subaverage intellectual functioning, which is operationalized as an IQ of approximately 70 or below (Criterion A). There must also be concurrent deficits in impairments in adaptive functioning in at least two of the following skill areas (Criterion B): (a) communication, (b) self-care, (c) home living, (d) social/interpersonal skills, (e) use of community resources, (f) self-direction, (g) functional academic skills, (h) work, (i) leisure, (j) health, and (k) safety. Additionally, the onset must occur before the individual is 18-years-old (Criterion C).

Four degrees of the severity of mental retardation can be specified, each reflecting a different level of intellectual impairment: (a) Mild, which is diagnosed at an

IQ of 50-55 to 70, (b) Moderate, which is diagnosed when an IQ is from 35-40 to 50-55, (c) Severe, which is diagnosed when IQ is from 20-25 to 35-40, and (d) Profound, which is diagnosed when IQ is found to be below 20 or 25.

No specific personality and behavioral features are uniquely associated with Mental Retardation. Some individuals with Mental Retardation are passive, placid, and dependent, whereas others can be aggressive and impulsive. Lack of communication skills may predispose individuals with mental retardation to disruptive and aggressive behaviors that substitute for communicative language (American Psychiatric Association, 1994). The major predisposing factors include: Heredity (approximately 5%), early alterations of embryonic development (approximately 30%), pregnancy and perinatal problems (approximately 10%), general medical conditions acquired in infancy or childhood (approximately 5%), environmental influences and other mental disorders (approximately 15%-20%) (1994). The prevalence rate of Mental Retardation has been estimated at approximately 1%. However, different studies have reported different rates depending on definitions used, methods of ascertainment, and population studied (1994).

During the late 1970s and early 1980s, numerous studies were conducted with mentally retarded and nonretarded populations that demonstrated a positive relationship between cognitive development and language acquisition (Clarke-Stewart, 1988). Although several studies (Brassell & Dunst,

1976; Kahn, 1978) established that object permanence could be taught to individuals with mental retardation, the question as to whether the attainment of object permanence affects language development has never adequately been answered. In fact, though it is commonly agreed that certain cognitive factors are necessary for the acquisition of language, there is as yet insufficient evidence that reveals the details of this association. Although numerous perspectives have been proposed to explain communication impairments among individuals with Mental Retardation, most theorists, teachers, and clinicians subscribe to an interactionist perspective (McCormick & Schiefelbusch, 1984). From this perspective, infants are born with a general predisposition to "perceive, organize, and interact with their world in certain ways" (p. 37) and their experiences in the environment influence significantly the way they communicate.

Many different language interventions have been used with communication disordered populations, some with more success than others. These approaches are next reviewed.

Language Intervention Approaches

Given that the study of language is such a complex phenomenon, it is not surprising that interventionists have advocated a variety of training approaches, each of which is based on a particular theoretical stance that is believed to account for language. For example, in the late 1950s and early 1960s, communication programs focused on the structure (i.e., syntax) of language, which was believed to be

determined by an innate linguistic mechanism called the language acquisition device (Chomsky, 1957). At approximately the same time, Skinner (1957) postulated that verbal behavior was learned through the processes of imitation, practice, and reinforcement.

In the late 1960s and early 1970s, the semantic-cognitive perspective emerged (McCormick & Schiefelbush, 1984). Through the work of researchers as Bloom (1970, 1973), Brown, (1973), and Schlesinger (1971), it was determined that children's one and two-word utterances reflected a variety of meaning based more on cognitive than syntactical knowledge. These researchers found that the communication of children around the age of 2 years reflected their cognitive development during their sensorimotor period. For example, children expressed meaningful utterances based on their understanding of the identity and permanence of objects, the relationship between objects, and cause and effect. Thus, individuals who advocated a sensorimotor-cognitive curriculum for teaching language skills to individuals with mental retardation (e.g., Bricker, Dennison, & Bricker, 1975: Kahn, 1975, 1978) based their approaches on the work of Piaget (1962, 1963). Based on these interpretations, practitioners designed training programs that taught individuals with mental retardation to communicate in rote and nonfunctional ways that frequently did not generalized across either respond or stimulus dimensions.

Interventionists with a more developmental theoretical

orientation emphasize embedding early communication objectives in the context of joint activity routines, which consist of activities that (a) have a simple purpose (b), are pleasurable, (c) can be accomplished by taking turns with a partner, (d) can be repeated frequently, (e) allow for roles (or actions) of the two participants to be reversed, and (f) allow for simple variations in the exchange. An example of joint activity routine includes social games like peek-a-boo and patty cake.

Interventionists now recognize that optimal results occur from emphasizing all three communicative modes (i.e., verbal, graphic, and gestural) early in an intervention (Mirenda & Beukelman, 1992). However, when interventionists suggest implementing multimodal interventions, parents often become concerned that using gestures and graphics may in some way diminish their child's propensity to acquire speech. However, no credible empirical data are available suggesting any negative effect on vocal mode production. Moreover, most experts in the field of augmentative communication agree that most individuals with severe disabilities can benefit from a blending of language interventions that use vocal, graphic, and gestural modes (1992).

Literature in this area generally agrees that communication interventions must be carefully considered according to the range of communicative modes that may be available to the individual. Care must be taken to match a communicative mode with communicative functions that will

result in social consequences that are important to the recipient of intervention.

In general, the task of learning communication can be conducted through direct or indirect instructional strategies. When considering which intervention to select, it has been recommended that interventionists select the least intrusive strategy that makes it possible for the learner to produce a correct communicative utterance with minimal struggle (1992). A range of naturally available supporting cues and prompts may influence a learner performance, which can lessen the need to use more artificial prompts. This view is consistent with Vygotsky's zone of proximal development, discussed earlier, that views a child's acquisition of communication as an interactive process in which the environment provides support for the use of new language structures. In a stimulating environment, support flows as a function of the support needed for the child to communicate in a struggle-free manner. Thus, if features of the environment that help ensure learner responding can be identified, interventionists can ensure that those features are present during the early phases of intervention.

The implementation of indirect instruction strategies in graphic and gestural modes has been reported by Romski and Sevcik (1993). Their impressive body of work with individuals with severe communication disabilities, their teachers, and their parents included providing these individuals with electronic communication aids. As a result of in-service and

tutoring regarding methods of indirect communication instruction, they reported significant communicative gains by learners without substantial amounts of direct instruction. Although the research demonstrated that persons with severe disabilities could benefit significantly from less direct instruction, a small but significant number of individuals with severe disabilities may require more direct instruction.

Because the present study focused on the use of signing as an intervention, it is necessary to briefly review the non-signing and signing interventions that have commonly been used.

Non-Signing Interventions

There are many controversial techniques for helping those who cannot speak. Treatment for central auditory processing disorders (CAPD), temporal processing deficits, auditory integration training (AIT), sensory integration (SI) therapy, and facilitated communication (FC) are a few of the many treatment methods that focus on perceptual and sensory processes and their organization. The underlying rationale for these types of interventions is that deficits in language and learning are due to deficits in sensory and perceptual abilities (Creaghead, 1999). Questions about the relationship between the identified deficits and language and learning problems, and whether improvement in specific skills result in improved functional language and learning, remain unanswered. Additional research is needed to facilitate clinician's choices regarding intervention options.

For instance, although the use of FC has brought hope to many, it remains a dubious intervention. In this strategy, the facilitator assists the person without speech in using a spelling board or keyboard to create words by either pointing out letters or typing on the keyboard. Controversy centers on who is actually communicating: the facilitators or their charges. Claims of successful communication with FC for individuals with a wide range of disabilities have been in largely anecdotal, with limited research evidence (Berard, 1993: Biklen, 1993; Crossley, 1994).

Recently, the study of pragmatic has influenced communication programs for persons with mental retardation. Bates (1976) defined pragmatic as the study of speech acts (intentions) and that rules governing how language is used across a variety of social contexts. Speech acts can be assessed by how closely they match the context and according to the manner in which they affect the environment or mediate the behaviors of others. According to Rogers-Warren and Warren (1981), "successful mediation depends on (a) discrimination of the critical stimulus conditions (context), and (b) production of a communication form that is responsive to those conditions" (p. 392). In addition, the speech act must affect the environment in ways the speaker intended.

Signing Interventions

Using signs as gestural cues has been demonstrated to be a promising instructional strategy for a variety of

communication problems (Musselwhite, 1986). Signing has met with considerable success with a wide variety of clients, ranging from preschool mentally retarded children to adolescent autistic clients to aphasic adults (Musselwhite & St. Louis, 1982). The gestural cue procedure is an effective facilitator of many language goals, especially when combined with natural language training events. Signs serve many of the same functions as pictorial stimuli, which are often used in language instruction to cue students in production of specific language forms. It is easily learned and has the advantage of being nonintrusive in the natural environment.

Kriegsmann, Gallaher, and Meyers (1982) addressed the many complex decisions that take place when designing a signing program for severely language-delayed students. For example, the decision to teach sign language to a child must be based on and supported by data relevant to that child's specific needs. In the assessment process the child's developmental status, the response from the different people involved, and the skill level of the training staff are components of appropriate program development. Insufficient and/or superficial data, the impact on the child, the family, and the classroom, as well as individual objectives, and program productivity also need to be addressed.

One of the most important factors to consider is the child's functional level, rather than chronological age. According to Kriegsmann et al. (1982), an appropriate candidate for a sign program should be at least in the

sensory-motor stage of development (Piaget, 1962). For example, the child must demonstrate that he or she can manipulate objects, indicate knowledge of functions, use a variety of means to achieve a certain end, search for objects out of sight, imitate an event, communicate intent, respond to the meaning of words, and pay attention to events with another person. These behaviors are crucial to signing because, through signing, children demonstrate the beginning of representational thought. Signs enable the child to represent the event itself. According to Chapman and Miller's (1977) study with low functioning children, the need for signs or any nonverbal system must be evaluated. Some children will acquire verbal language like other children. The first choice for any child delayed in verbal language development should be the provision of at least 6 months of intensive verbal language intervention (1977).

Manual communication signs or gestures, paired with speech, are also often recommended for language delayed mentally retarded students (Fristoe & Lloyd, 1997). In fact, Bricker (1976) showed that training in imitation of manual signs increased comprehension of spoken language in his sample of children with Mental Retardation. In another study, Grinnell, Detamore, and Lippke (1976) reported an increase in speech sounds and spoken vocabulary subsequent to implementing Manual English plus speech with severely retarded and multiply handicapped children. Many other studies (e.g., Harris-Vanderheiden & Vanderheiden, 1977;

Hobson & Duncan, 1979) have recognized training in non-oral communication systems as a facilitator for spoken language in children with severe handicaps. In addition, an extensive research project conducted to examine the facilitative effects of manual signs on oral language comprehension of children with communication disorders and normal hearing students (Lloyd et al., 1982), persons with language-delay and mental retardation demonstrated that the use of simultaneous manual and oral cues resulted in greater receptive acquisition of new material than did the use of oral cues only (Bricker, 1976; Kohl, Karlan, & Heal, 1979). In implementing these programs, many affective concerns need to be addressed as well. Signing programs may uncover feelings of awkwardness or self-consciousness, as well as fear of negative family reaction and the anxiety about the child's loss of some speech skills. These concerns should be addressed in regular staff and family meetings to acknowledge these concerns and to lead to program modifications (Kriegsmann et al., 1982).

Because signing is mostly used for the deaf, most of the literature on its use is on this population. The research in this area indicates that deaf children who are exposed to some form of early manual communication, whether in the home or in a classroom setting, are superior in language and academic achievement compared to matched groups of children restricted to exclusively oral environments during their early years (Birch & Stuckless, 1964; Meadow,

1967; Quingley, 1969). Research has also demonstrated that early manual communication will not impede the development of communication skills.

Although there are many different signing techniques, including the Rochester Method, one of the most commonly used and well researched is American Sign Language. The use of American Sign Language (ASL) is frequently recommended in the educational setting because of its efficacy in accomplishing the following goals: (a) the development of English language skills in students whose native language is ASL and in students who are having difficulty learning English (Rosen, 1975); (b) the development of skills in a second language by students whose native language is English (1975); (c) the effective functioning of students as participants and leaders in the deaf community in America (Cokely, 1977); (d) the development in hearing impaired (and hearing) students of an appreciation of the role of deaf people in American culture, and in so doing, a positive image of themselves; and (e) the total educational development (academic, personal, and social) of the student (1977).

Despite the potential application for signing in children with communication disorders with normal hearing, very little emphasis has been placed on using these procedures as a systematic intervention. The reason for this most likely stems from the belief that sign language is only for the deaf or hard of hearing. Instead, behavioral interventions have dominated the treatment of children with

communication disorders.

Behavioral Interventions

Applied Behavioral Analysis

The most common of the behavioral approaches for children with cognitive and communication disorders is Applied Behavioral Analysis (ABA), which has been documented to produce significant and comprehensive improvements with children with Autism and other Pervasive Developmental Disorders (PDD). ABA is a program of intensive one on one teaching based on research first published by B.F. Skinner in 1938 and later expanded by many others. Successful use of ABA methods for children with Autism was first documented in the 1960s (see Baer, Wolf, & Risley, 1968) but widespread use of ABA began in 1993 when an article was published about the recovery of two children from autism (Maurice, 1993). In addition, that same year appeared a highly regarded study documenting the extraordinary gains made by children receiving intensive behavioral interventions (McEachin, Smith, & Lovaas, 1993).

ABA is an intensive, structured teaching program. Lessons are broken down into their simplest elements. These elements are taught using repeated trials where the child is presented with a stimulus (e.g., "do this" or "look at me"). Correct responses are rewarded with positive reinforcement, incorrect responses are ignored, and appropriate responses are prompted and rewarded. Undesirable behaviors are approached in the same manner. At first, the child may be

rewarded for doing something close to the desired response. Over time, as the child masters the objective of the lesson, expectations are raised and primary reinforcers (e.g., bits of food) are replaced with social reinforcers (e.g., hugs, praise, etc.). As the child masters and generalizes the skill, the skill becomes self-reinforcing. Simple skills, such as imitation and attention, are learned in this manner and can be combined into more complex skills, such as language, imitation, play skills, and social interaction. Because children within the Autism spectrum vary enormously in their strengths and weaknesses, individualized lessons are developed to meet the particular needs of each child.

A typical program consists of up to 40 hours per week of intensive one-on-one teaching on a year round basis for 2 or more years. Teaching may be done by professionals, families, or by volunteers guided by an expert consultant. The consultant develops the program and instructs the teachers in the techniques. Lessons may begin in the child's home or school. When begun in the home, following the child's improvement, lessons move out of the home and into the school and the community. This promotes the child's ability to generalize. ABA is highly structured and quantified.

A key element of most ABA programs is the recording of objective and precise data to identify needs and to measure progress as each drill and lesson is repeated. These data are used to determine mastery of the lessons, to document progress over time, and to modify the teaching plans when a

particular lesson or drill is not effective.

Although aversive and negative reinforcements were used in the original study (Lovaas, 1987) to address some severely problematic behaviors, no reputable program uses them today. Current ABA programs use positive reinforcement to increase desirable behaviors, which are then used to replace the undesirable behaviors. ABA programs normally teach acceptable behaviors, such as academic and self-help skills. For more difficult behaviors, the child is redirected from the problem behavior to an alternative that is socially acceptable. Though the initial teaching is often repetitive and involves a large amount of structure and imitation, significant efforts go into teaching the child how to learn and into making sure the lessons are fun for the child. As the child advances, the highly structured program becomes more flexible.

ABA research has documented 40 to 50 percent recovery rates for children who started school as young as 2-years-old who were mainstreamed without support; there are also many reports of significant improvement (but not recovery) in children who started at 7-years-old and later (McEachin, Smith, & Lovaas, 1993). Some research into intensive interventions has shown positive results with as little as 20 hours or more per week. Yet, most of the research documented success involved children who had between 30 to 40 hours of ABA on a year round basis for at least 2 years (1993).

Functional Assessment

Behavioral support for students with severe disabilities is far more than a process of reducing problem behaviors by rewarding desired behavior and punishing (or ignoring) undesirable behavior. To a very great extent, effective behavioral support is also about the engineering of settings, such as schools, homes, and work, so that the problem behavior becomes less likely to occur. Problem behaviors, such as aggression (e.g., hitting, biting kicking), self-injury (e.g., head banging, self-biting), pica, property destruction, and disruption (e.g., screaming, throwing, pounding), have been a major cause of exclusion of students with severe disabilities (Reichle, 1990). Without effective behavioral support, students who exhibit problem behaviors face educational isolation, vocational isolation, community isolation, social isolation, medical risk, and exposure to highly intrusive forms of control and treatment.

Functional assessment is a method for identifying the variables that reliably maintain problem behavior. The variables consist of consequences (i.e., the purpose, intent, function, motivation, or goal of the behavior), antecedents or discriminative stimuli (i.e., the cues that trigger the behavior), and setting events (i.e., the broad context that influences the likelihood that a specific cue will trigger problem behavior). Two important implications can be derived from a description of functional assessment. First, the focus is on the environmental events (i.e., antecedents,

consequences, and setting events). Thus, rather than viewing the problem behavior as the result of invisible, dynamic forces residing "within" the child, behavior is viewed as the result of challenging social situations for which the problem behavior itself represents an attempted solution (e.g., head-banging represents one way of getting someone to provide a toy). Second, because environmental determinants are so important, interventions are not focused on "managing" or "controlling" the child, but on redesigning the environment and building new skills that make problem behavior irrelevant, inefficient, and ineffective in that environment. The problem behavior becomes irrelevant to the extent that those conditions that set the occasion for the problem behavior are not present (i.e., if toys are available). The problem behavior is inefficient if the child has an alternative (appropriate) way of obtaining the same reinforcer that typically is delivered following problem behaviors. And the problem behavior becomes ineffective to the extent that the typical reward for problem behavior (e.g., attention, toys, activities, escape) is not provided.

A functional assessment is performed to improve the effectiveness and efficiency of an intervention. This is done through (a) understanding what maintains the problem behavior, (b) predicting when a problem behavior will and will not occur, (c) identifying ways to prevent occurrence of the problem behavior, and (d) designing procedures for responding to the problem behavior when it does occur.

Understanding the consequences that maintain a problem behavior is a key to building effective interventions. Examining consequences makes it possible to hypothesize the purpose of the behavior. By examining antecedents and setting events, it is possible to predict when the problem behavior is most and least likely to occur. Combining knowledge of prediction with knowledge of what maintains the problem behavior enables development of prevention and intervention strategies.

There are three generic methods for carrying out a functional assessment: (a) interview, (b) descriptive observation, and (c) functional analysis. Interview is the functional assessment method most commonly used by practitioners. The person doing the assessment interviews teachers, family members, or professionals who are most familiar with the individual in question. These people are asked three things: (a) the physical description of the problem behavior, (b) the circumstances that predict occurrence and nonoccurrence of the problem behavior, and (c) the reaction that such behavior evokes from others (Carr et al., 1994; Durand, 1990).

One goal is to provide an operational definition of the problem behavior. Thus, subjective definitions are avoided (e.g., "Billy gets angry") in favor of specific, objective descriptions (e.g., "Billy kicks, punches, and bites"). With respect to triggering stimuli, the interviewer asks questions about specific antecedents, as well as specific setting

events. Finally, with respect to reactions from others, the interviewer asks questions about specific consequences of the behavior.

Conclusion

The review of the literature implies that, for children with a developmental disability who have a disorder of communication, the use of American Sign Language in addition to a standard behavioral program could produce a decrease in behavioral problems as children learn how to better express their needs. It is expected that by using a mechanism by which language can be mediated, behavioral problems would decrease because they would no longer be functional in obtaining the desired goal. The goal of the present study is to examine this supposition by way of testing the following four hypotheses.

Hypotheses

H1: When added to an existing ABA intervention, the use of ASL signing with developmentally delayed children with a disorder of communication will reduce the amount of negative disruptive behavior they exhibit.

H2: When added to an existing ABA intervention, the use of ASL signing with developmentally delayed children with a disorder of communication will reduce the amount of aggressive behavior they exhibit.

H3: When added to an existing ABA intervention, the use of ASL signing with developmentally delayed children with a disorder of communication will reduce the amount of tantrumming behavior they exhibit.

H4: When added to an existing ABA intervention, the use of ASL signing with developmentally delayed children with a disorder of communication will result in their using ASL signs to communicate their needs more than before the signs are introduced.

CHAPTER II

METHOD

Research Design

This investigation utilized a multiple baseline design across seven developmentally disabled children with communication disorders. The baseline and intervention periods were each two consecutive weeks (Monday thru Friday) for a total duration of 20 days. The intervention comprised teaching children behavior-specific ASL signs in addition to their pre-established ABA treatment. The dependent variables were (a) aggressive behavior, (b) tantrumming, (c) use of ASL signs, and (d) overall disruptive behavior.

Research Participants

Participants in this study were seven children developmentally delayed children with communication disorders (girls: n = 4, boys: n = 3) between the ages of 8- and 13-years-old. The children were recruited from 1 of the 5 sites (four preschool and one school age) of a private non-profit, state funded school for children with mental retardation, an educational disability, Autistic Disorder, severe emotional disturbance (SED), and/or physical disability. The school and site the children were selected from are described in further detail below. Selection of participants was based on the children's extreme levels of inappropriate, aggressive, and self-injurious behavior. Of the children enrolled in the

school, these seven had the most extreme behavior problems. All descriptions of the participants are based on their level of functioning prior to beginning the study.

Participant 1

Participant 1 was a 10-year-old boy diagnosed with Down Syndrome Stigmata. He was nonverbal and tapped books, toys, and other objects on his chin in a self-stimulating manner. He was not interactive with his teachers or his peers. He communicated through pictures and the Mayer-Johnson symbols (Mayer-Johnson, 1992). He could follow one-step directions and match, recognize, and identify pictures to verbal prompting. He responded to his name and responded well to verbal reinforcements. He was Hypotonic and had limited mobility. He had a history of throwing himself down on the floor and refusing to walk and was often difficult to pick up. The ABA program for this participant focused on improving daily living skills, such putting on his jacket and other clothes.

Participant 2

Participant 2 was a 13-year-old girl diagnosed with Mental retardation with significant autistic features, including lack of eye contact, echolalia, tactile defensiveness, self-stimulatory behaviors, insistence on routine, and a limited repertoire of activities she could perform. She displayed profound deficits in all areas of functioning, including cognitive, adaptive behavior, language, social, and emotional. She ignored people but could

respond to familiar tasks and routines. She refused to participate in many daily living and classroom routines and tantrums when forced into an activity. Prior to this study, her ABA program focused on eye contact and labeling objects. This participant's ABA program centered on the daily living skills of putting on her shoes, tying her shoes, and eating with a spoon.

Participant 3

Participant 3 was an 8-year-old girl who was diagnosed with noncongenital progressive Microcephaly, severe mental retardation, neurological impairments, hyperactivity, hypotonia, and a febrile seizure disorder. This participant required a Rifton-type chair, which is a chair that is similar in design to a high chair but with protective padding, wheels, and a safety belt constraint, to address her safety, focus, and proper seating needs. She also required individual attention with a health paraprofessional to help her manage the daily routines without falling and hurting herself. This participant frequently tried to verbalize and make sounds and could say "hi", "bye", and "mommy". She related to pictures of familiar people and could identify her teachers and other students in her class. Verbal responses were encouraged and reinforced with favorite foods. This participant was easily distractible and needed constant refocusing. Her ABA program focused on dressing skills.

Participant 4

Participant 4 was a 10-year-old boy diagnosed with Atypical Microcephaly and developmental delays. He was neurologically impaired, wore orthotics, and had great difficulty ambulating independently. He was nonverbal, functioned in the profound range of Mental Retardation, and used a picture recognition system to communicate his needs. He responded to one-step commands, could imitate fine and gross motor movements, and could say "hi", "bye", and make sounds. This participant's ABA program focused on dressing skills, eye contact, matching pictures, imitating fine and gross motor movements, and choosing desired foods and objects. He was able to match and recognize Mayer-Johnson symbols (1992) with 40% accuracy.

Participant 5

Participant 5 was a 10-year-old boy diagnosed with Down's syndrome and mental retardation. This participant was nonverbal, but made sounds and communicated by using Mayer-Johnson symbols (1992). He resided at a group home where he is said to be well adjusted. This participant could match and sort colors and identical pictures. Prior to the study, he often became frustrated because of his inability to communicate. He would pull hair, bite, throw toys or chairs, and would often throw himself on the floor, out of his chair, and even out of his stroller. His ABA program focused on pointing to items, such as books and balls.

Participant 6

Participant 6 was an 11-year-old girl diagnosed with Cornelia De Lange Syndrome. In addition to severe retardation, this participant suffered from progressive hearing loss that led to current functional deafness and severe behavioral problems. Despite the hearing loss, she refused to wear hearing aids and an FM unit (i.e., an assistive listening devise [ALD] that uses frequency modulated [FM] radio waves to transmit signals from transmitter to receiver to amplify desired sounds). Behaviors included constant mobility, pulling and tearing at pictures, desks, shelves and walls, placing objects in her body orifices (e.g., ears, nose, eyes, etc.) and those of other children. She grabbed things and wrote and colored anything in sight, including her own and other people's bodies. This participant also engaged in self-mutilation; this behavior included scratching herself until she bled and then playing with her blood by smearing it on herself, objects, and others. She also banged her head on the floor or the wall and pressed her hand into her teeth until her hand bled. This participant cried constantly and was tactile defensive, which was expressed as resistance to physical contact. Prior to this study, she was unable to communicate effectively and was easily frustrated. She communicated through unintelligible sounds, gestures, and facial expressions. This participant's ABA program also focused on pointing to articles that she needed.

Participant 7

Participant 7 was an 8-year-old boy diagnosed with Down's syndrome. This participant also had been diagnosed with hyperopia and nystagmus (although he did not require vision correction devises), a congenital heart defect, and an atrial-septal defect. Medical records indicated that he had a history of seizures, chronic otitis media, aphasia, frequent upper respiratory infections, and a mild case of conjunctivitis. Except for his heart murmur, he was asymptomatic at the time of the study. The participant was not on any cardiac medications other than prophylactic antibiotics prior to dental or other medical procedures.

Although this participant's audiological evaluation found his hearing to be within borderline normal limits due to his chronic ear fluid, a potential mild to moderate hearing loss had gone undiagnosed for at least 1 year. He exhibited severe receptive and expressive language deficits. He responded to his name, understood directional instructions, and tried to vocalize when he wanted something. When feeling misunderstood, this participant would take people by the hand and lead them to what he wanted or to the place he wanted to go. During the time of the study he was receiving bilingual speech and language therapy that focused on production on vowel-like and bilabial sounds, comprehension, and signing basic concepts (e.g., open/close, in/out). When Meyer-Johnson symbols were introduced, the participant showed little understanding and interest in them.

At the time of the study he demonstrated self-stimulating behavior, such as hitting, popping his jaw, banging his head, and grinding his teeth. The ABA program directives focused on encouraging eye contact and daily living skills, such as putting on and tying his shoes and putting on and taking off his jacket.

The Setting

The site that was used for the present investigation had 72 school aged children, was nonsectarian, and provided bilingual services in the following languages: (a) English, (b) Yiddish, (c) Hebrew, (d) Arabic, and (e) Russian. The study was done at this site because it serviced children with the most severe levels of functioning. All enrolled children had to be admitted through an Individualized Education Plan (IEP) from their school district of residence; no children were privately placed. All children are placed by the Board of Education when there was no other appropriate school in which to place them. Aside from behavioral disturbance, the primary criterion for acceptance into the school was IQ: all children must be below an IQ of 75 (i.e., borderline intellectual functioning or below). The focus of the school program is to enable children to reach their physical and cognitive potential, to whatever extent possible.

Children were placed into classes based on their abilities, mental age ranges, behavior, and functional skills. Ambulatory children were on 2nd floor and wheelchair bound children on first. Participants 1 through 5 were all

from the same class and the remaining two participants were from another class. The ratio of children to teachers to teachers-aides ranges from 6:1:2, 8:1:2, to 12:1:2. In many classes, particularly the class that the students from this study were recruited from, the ratio was 1:1:1.

In addition to teachers and teachers' assistants, the site had on staff three psychologists (two master's level school psychologists and one doctoral level), one on-call psychiatrist, one social worker, two registered nurses, one gym teacher, a music therapist, an occupational therapist, a physical therapist, a speech and hearing therapist, one administrator, three secretaries, two cooks, and two maintenance personnel. ABA specialists also came in once every 2 to 3 months to check specific behaviors.

All children were bused to school and attended from 8:30 a.m. to 2:30 p.m. The ABA protocols are initiated as soon as the children arrived. Each child's ABA program was unique to that child and focused on adaptive competencies, such as behavioral, cognitive, and daily living skills (e.g., eating with a fork and looking at a person when addressed). During these ABA periods, a teacher, teacher's-assistant, or intern presented the skill to be learned 10 consecutive times, which equals one trial. Each morning a new trial began. The focus switched to a new skill when 80% accuracy is obtained 3 out of 4 trials. When the child correctly was a skill, he or she immediately received a tangible reinforcer, which was commonly food or the use of a toy.

After three consecutive times of performing the skills correctly, the reinforcement changed to an intangible reinforcer, such as verbal praise. If the skill was performed two trials with 80% accuracy and then on the third trial the child regressed to less than 80% accuracy, no reinforcement was given but the child was still asked to perform the skill. When a child did not do the targeted behavior, the teacher modeled the behavior for the child (e.g., picked up a spoon). Modeling times were not reinforced.

After the ABA trials were completed, children were taken to the bathroom and breakfast. After this, children attended "circle time" with their classmates. During circle time, questions about the day's weather, the day of the week, and reviewing of everyone's names took place, as well as singing. After this time coloring activities were performed at their individual desks, which was followed by going to gym class. The 1-hour lunch break began at 11:30 a.m. After lunch, the children attended music therapy, were read to, and then had flexible time in the afternoon to perform whatever tasks the teacher deemed appropriate. At 2:30 p.m. the children boarded the buses to return home.

Measures

Descriptive information on the participants was obtained from their student files located at the school site. Other measures were created to obtain daily ratings of the target behaviors. The Behavior Rating Scale was created to

measure aggressive behavior, tantrumming, and the use of ASL signs. The Student's Behavior Rating Scale was designed to measure overall disruptive behavior throughout the day. The ABA rating sheet was already being implemented in the school to monitor each child's progress on the behaviors targeted for the ABA intervention.

Behavior Rating Scale

The Behavior Rating Scale (see Appendix A) was developed for the purposes of this investigation to measure three behaviors throughout the day: (a) aggressive behavior, (b) tantrumming, and (c) use of the ASL signs. Behavioral indicators for each of these three domains were identified for each child. For example, for Participant 2, aggressing behavior was defined as tapping of hands, sticking hands in her mouth, sticking her tongue out, and sticking her hands in her pants. Tantrumming was defined for this child as screaming, throwing herself on the floor, turning over furniture, and crying hysterically. The ASL signs were those signs targeted for the intervention. For this participant, they included "brush me", "music", "out", "hug", and "toilet". These behavioral indicators were determined from weekly observations of the children over 8 months prior to the onset of the study. Classes were observed at different times of the day to ensure a broad sampling of the behaviors. Behaviors were identified that required a teacher or other staff member to tell the child to stop the behavior. Teachers verified the utility and

accuracy of the behavioral indicators chosen.

Each behavior was rated by the teachers on a 3-point scale based on the frequency of occurrence during the scheduled observation time: (a) no episodes occurred (0), (b) 1-2 episodes occurred (1), and (c) 3 or more episodes occurred (2). An interval-sampling approach was used to record these ratings. Recording occurred daily during two half-hour observation times: one before lunch and one during or after lunch. Thus, for each 5-day week there were a total of 10 ratings for each behavior. Morning observation periods were randomly assigned from 1 of the 5 possible observation periods (i.e., 9:00-9:30 a.m., 9:30-10:00 a.m., 10:00-10:30 a.m., 10:30-11:00 a.m., and 11:00-11:30 a.m.). Random assignment was done without replacement so that all morning time slots were accounted for over the course of the week. This same procedure was done for the five post-lunch periods (i.e., 11:30 a.m.-12:00 p.m., 12:00-12:30 p.m., 12:30-1:00 p.m., 1:00-1:30 p.m., and 1:30-2:00 p.m.).

This interval-sampling procedure was used because teachers were resistant to more frequent recording of the behavior. This methodology was a compromise between teacher's efforts and the ability to gain an adequate representation of the children's behavior over the duration of the study.

Student Behavior Rating Scale

The Student Behavior Rating Scale (see Appendix B) was developed for this study in consultation with an ABA

specialist to obtain an overall index of the children's disruptive behavior. At the end of each day teachers rated the child on a 6-point rating scale according to the number of disruptive episodes the child had experienced that day. The six values corresponded to three broad descriptions: (a) rarely disruptive (i.e., 1 = one episode; 2 = two episodes), (b) sometimes disruptive (i.e., 3 = three episodes; 4 = four episodes), and (c) very disruptive (i.e., 5, 6 = not 1 hour went by without an episode).

Procedure

After obtaining permission from school administrators to conduct the study, four meetings were arranged with the teachers and teachers' assistants whose students were to participate in the study. These meetings occurred weekly for four consecutive weeks before the onset of the study. During these meetings the primary investigator clarified the intervention and data recording procedures and criteria. In addition, teachers assessed the behaviors in the Behavior Rating Scale to verify that each of the aggressive and tantrumming behaviors was still present. Because five of the participants were in one class, one teacher was responsible for recording the data. The other two participants were from another class; therefore, another teacher was responsible for recording the data for these children. During these meetings, teachers were informed of the randomly assigned times that they would be recording the Behavior Rating Scale.

During these meetings the five ASL signs to be taught

were determined by discussing with teachers each child's problematic behaviors. Signs were identified for those behaviors (e.g., trantrumming) that were identified as being directly related to a lack of communication, such as help and please, etc.

Baseline monitoring began on the Monday following the last teacher meeting. Teachers completed the Behavior Rating Scale twice daily at the assigned times and the Student Behavior Scale at the end of each day. At the end of the second week teachers were called to remind them to begin the ASL intervention on the following Monday. Phone calls were also placed throughout the intervention week to verify that teachers were following through with the treatment. On-site monitoring also occurred twice weekly. Data collection during the intervention period had to be extended for a few additional days because for some days the teachers were not doing the ASL signs. Data were not recorded for these days.

During graduation ceremonies, which occurred one day after the study ended, the primary investigator publicly praised the teachers and teachers' assistants for their efforts in the study.

Data Analysis

Because the data collected in this study were based on a single-subject design, parametric statistics could not be used because of the serial dependency in the observations. As is most commonly done in these types of studies, the assessment of the hypotheses was conducted through the visual

inspection of general trends that were present in the data. Descriptive statistics were produced by the Descriptives module in the Statistical Package from the Social Sciences© (SPSS©) for Windows©, version 9.0. Graphs that were used to evaluate the hypotheses were produced by Microsoft© Graph.

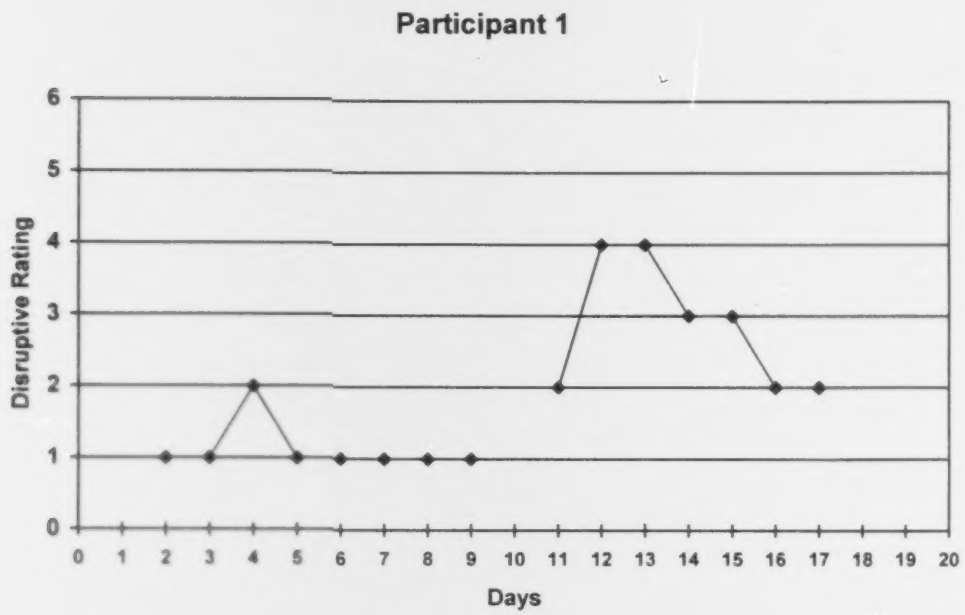
CHAPTER III

RESULTS

Before plotting the data for analysis, individual records were inspected for accuracy. This evaluation indicated that, although there was no evidence of response bias, the pattern of missing data appeared systematic. That is, missing data appeared to occur on the last day of the baseline period and during the last several days of the intervention period. All other missing data appeared random. Data were plotted to show the missing responses and averages were calculated based upon the data obtained for a given period.

H1: Analysis of Disruptive Behavior

Analyses were first conducted on overall levels of disruptive behavior, as measured by the end of the day Student Behavior Rating Scale scores. Figure 1 summarizes the results for the first two participants. During baseline participant 1 was relatively stable in that the mean number of disruptive episodes was 1.13. During the intervention period, however, this participant evidenced substantially more variability, with the low number of episodes of 2, a high of 4, and a mean of 2.86 episodes during the 7 days of recorded behavior. Participant 2 had a mean of 3.11 disruptive behaviors during baseline, which decreased slightly to a mean of 2.43 during the intervention period.



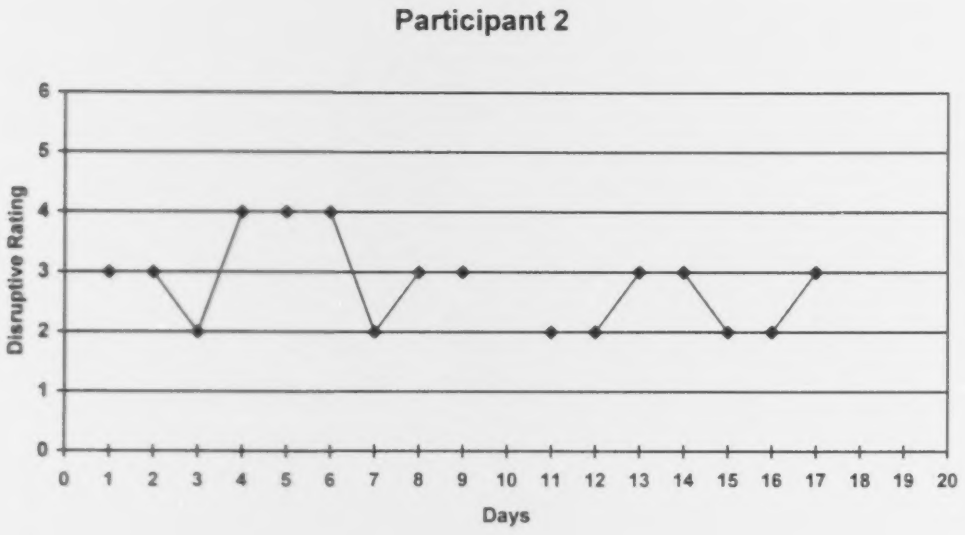


Figure 1. Disruptive behavior ratings across baseline and intervention periods for subjects 1 and 2.

Figure 2 depicts the disruptive behavior patterns for participants 3 and 4. Although participant 3 evidenced more variability in disruptive behavior during the baseline compared to the intervention period, the mean at baseline (M = 2.09) was comparable to that during the ASL intervention (M = 2.07). Participant 4 displayed no variability throughout the study period in the number of disruptive behaviors. This participant exhibited one episode per day for all of the days of the study, during both baseline and intervention periods.

The results on disruptive behavior for participants 5, 6, and 7 are shown in Figure 3. Participant 5 demonstrated a very unstable baseline with the number of disruptive episodes ranging from a low of one per day to a high of four on three separate days (M = 3.0). During the intervention period, however, this participant's episodes stabilized to a mode of two episodes per day. The mean decrease to 1.83 episodes was a substantial improvement over the baseline period.

Because of the lack of teacher follow-up, no data were collected for participants 6 and 7 during the intervention phase. The teacher responsible for the children implemented the treatment but did not complete the rating sheets as instructed. Thus, quantitative data were only available for the baseline period. For participant 6 baseline episodes of disruptive behavior ranged from 2 to 5 (M = 3.5) and for participant 7 the baseline range of episodes was slightly greater with the range being from 1 to 5 (M = 2.8). Thus, little support was found for decreased disruptive behavior.

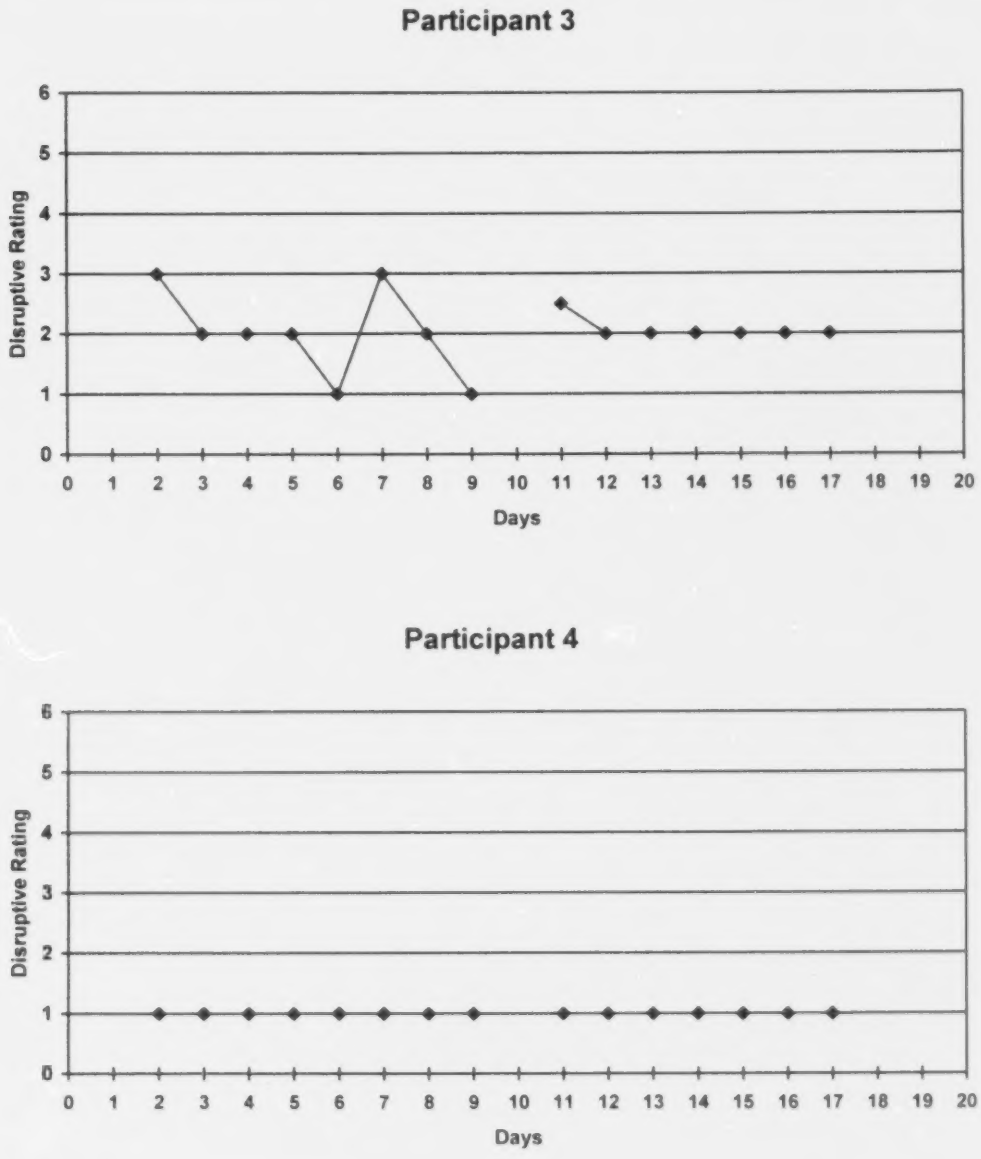


Figure 2. Disruptive behavior ratings across baseline and intervention periods for subjects 3 and 4.

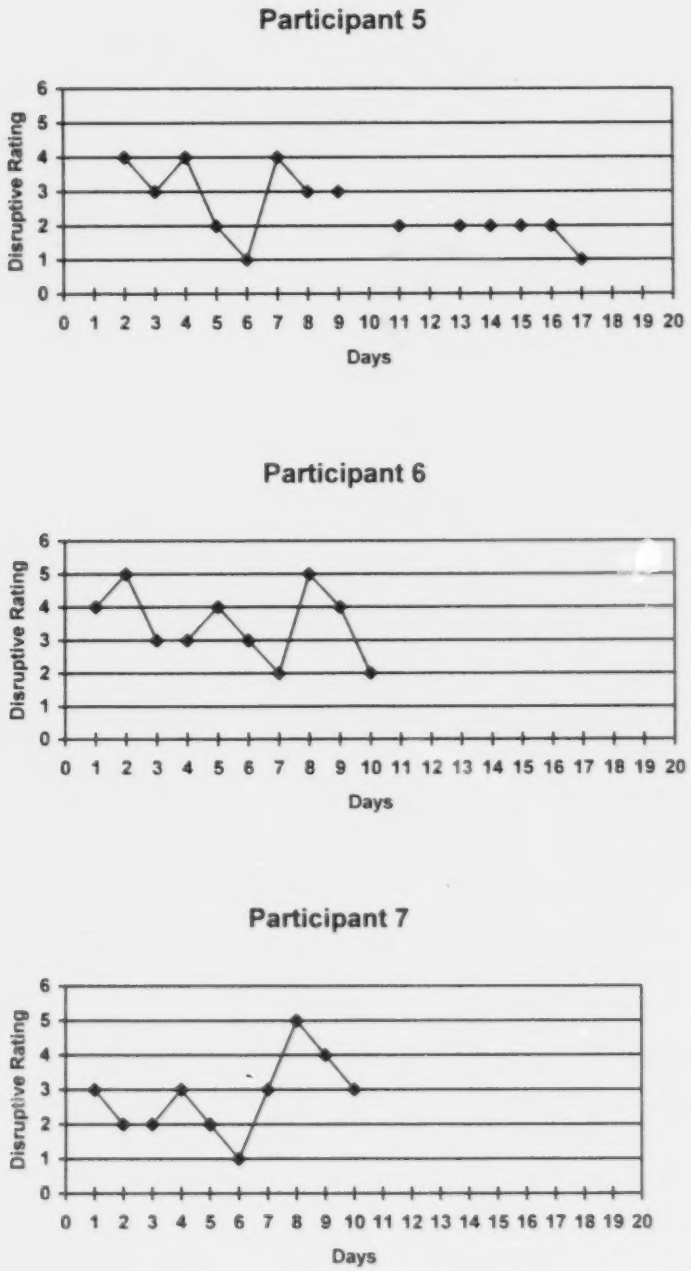


Figure 3. Disruptive behavior ratings across baseline and intervention periods for subjects 5, 6, and 7.

H2: Analysis of Aggressive Behavior

Aggressive behavior ratings from the Behavior Rating Scale were analyzed next. Because there was little variability between the morning and afternoon ratings, these ratings were averaged to yield a mean number of episodes of aggressive behavior on that day. It is these mean number of episodes per day that are represented on all the following graphs.

When examining the first two participants (see Figure 4), little evidence for change was apparent. The first participant had reports of two episodes of aggression per day throughout both the baseline and intervention periods. The second participant's number of aggressive episodes varied from 1 to 2 throughout both the baseline periods and the mean of 1.88 aggressive episodes at baseline was comparable to the mean of 1.83 episodes during the intervention period.

A similar pattern was found for the next two participants (see Figure 5). Participant three had only one day in which an aggressive episode was noted. During all other days of the baseline and intervention periods this participant had no aggressive episodes. Thus, the mean number of episodes at baseline (M = .11) was very similar to the mean number of episodes during the intervention phase (M = .00). Although the fourth participant evidenced somewhat more variability in the number of aggressive episodes demonstrated, the mean of 1.88 episodes during baseline was

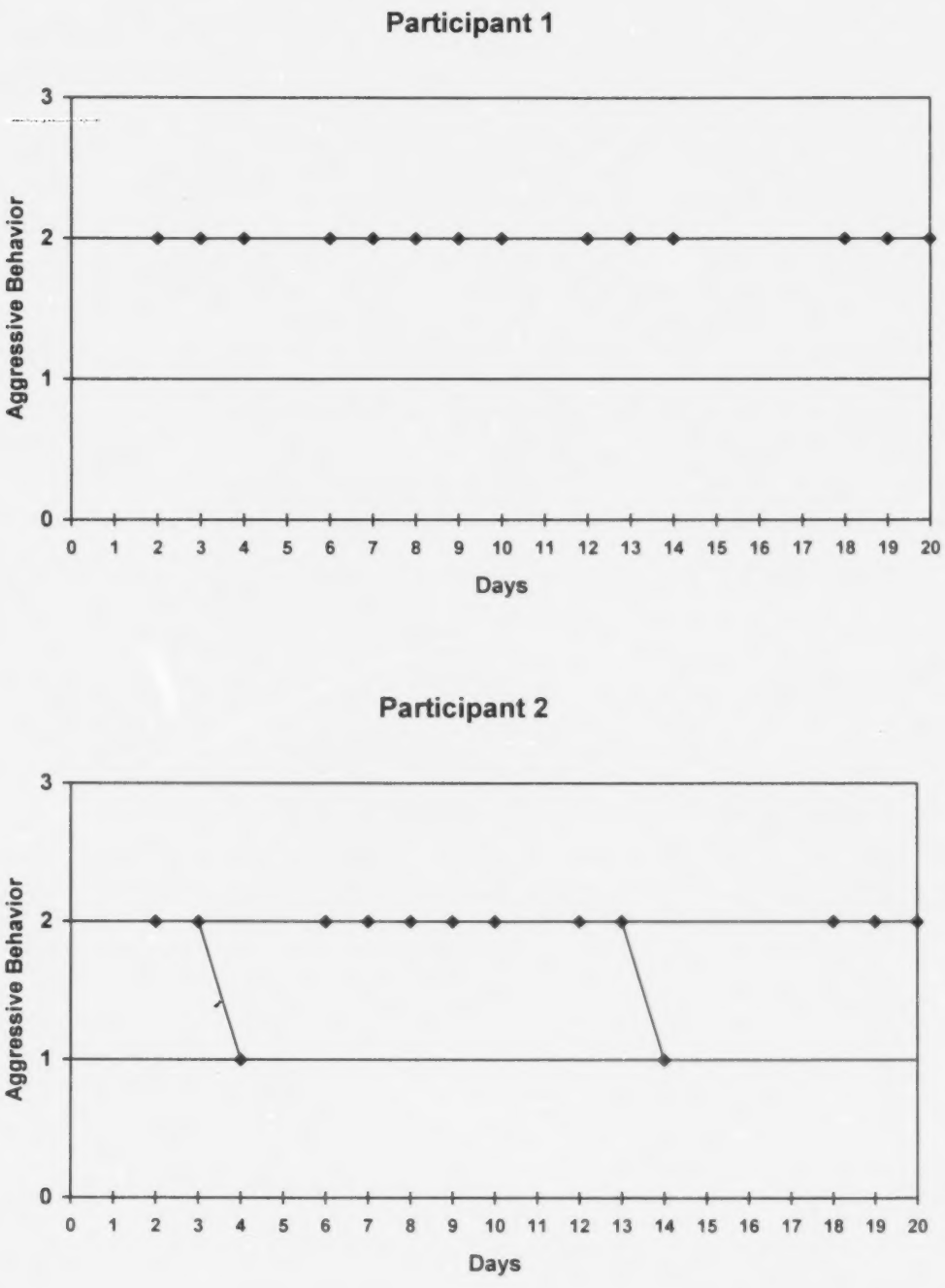


Figure 4. Mean number of aggressive episodes across baseline and intervention periods for subjects 1 and 2.

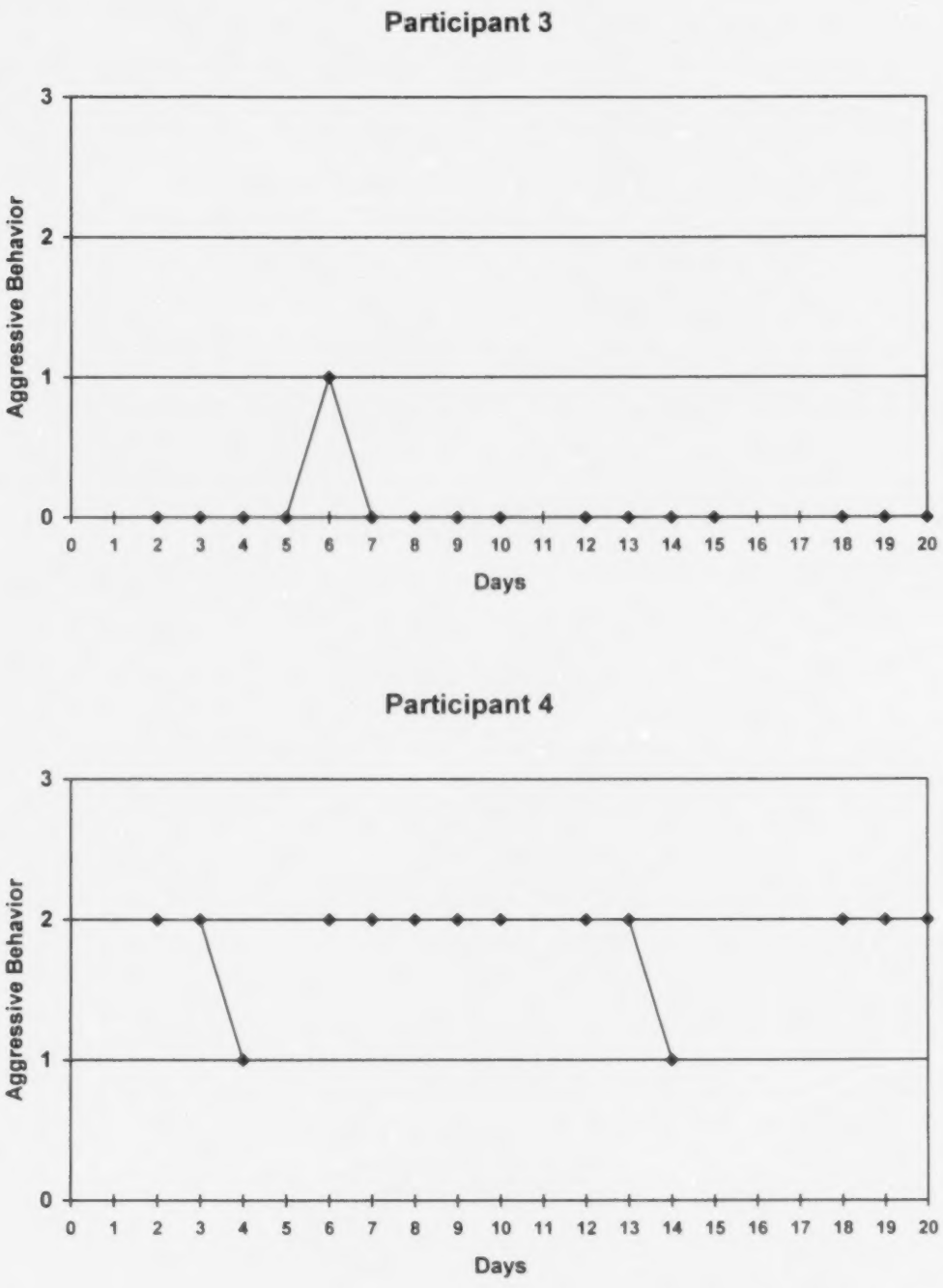


Figure 5. Mean number of aggressive episodes across baseline and intervention periods for subjects 3 and 4.

not much different from the mean of 1.83 episodes during the intervention period.

Figure 6 depicts the results for participants 5 and 6. No data were available on the aggressive ratings for participant 7. Participant 5 had tremendous variability in aggressive episodes at both baseline and during the intervention phase with the number of aggressive episodes ranging from 0 to 2 in both phases of the study. The means were virtually equivalent between the baseline (M = 1.11) and intervention (M = 1.08) periods. For participant 6 only baseline data were gathered. During this period the mean number of aggressive episodes was 1.2. Similar to that observed for overall disruptive behavior, these results do not support a strong decrease in aggressive behavior during the ASL signing intervention.

H3: Analysis of Tantrumming Behavior

To examine the extent to which the ASL intervention had an effect on tantrumming, the Behavior Rating Scale ratings for the number of tantrumming episodes were evaluated. As was done with the aggressive behavior ratings, mean scores were obtained for each day by averaging the morning and evening ratings, which did not vary much from each other.

Figure 7 summarizes the results for participants 1 and 2. Contrary to expectations, for participant 1 the number of tantrumming episodes was actually greater during the intervention period (M = .80) in comparison to the baseline period (M = .25). The second participant, however, did not

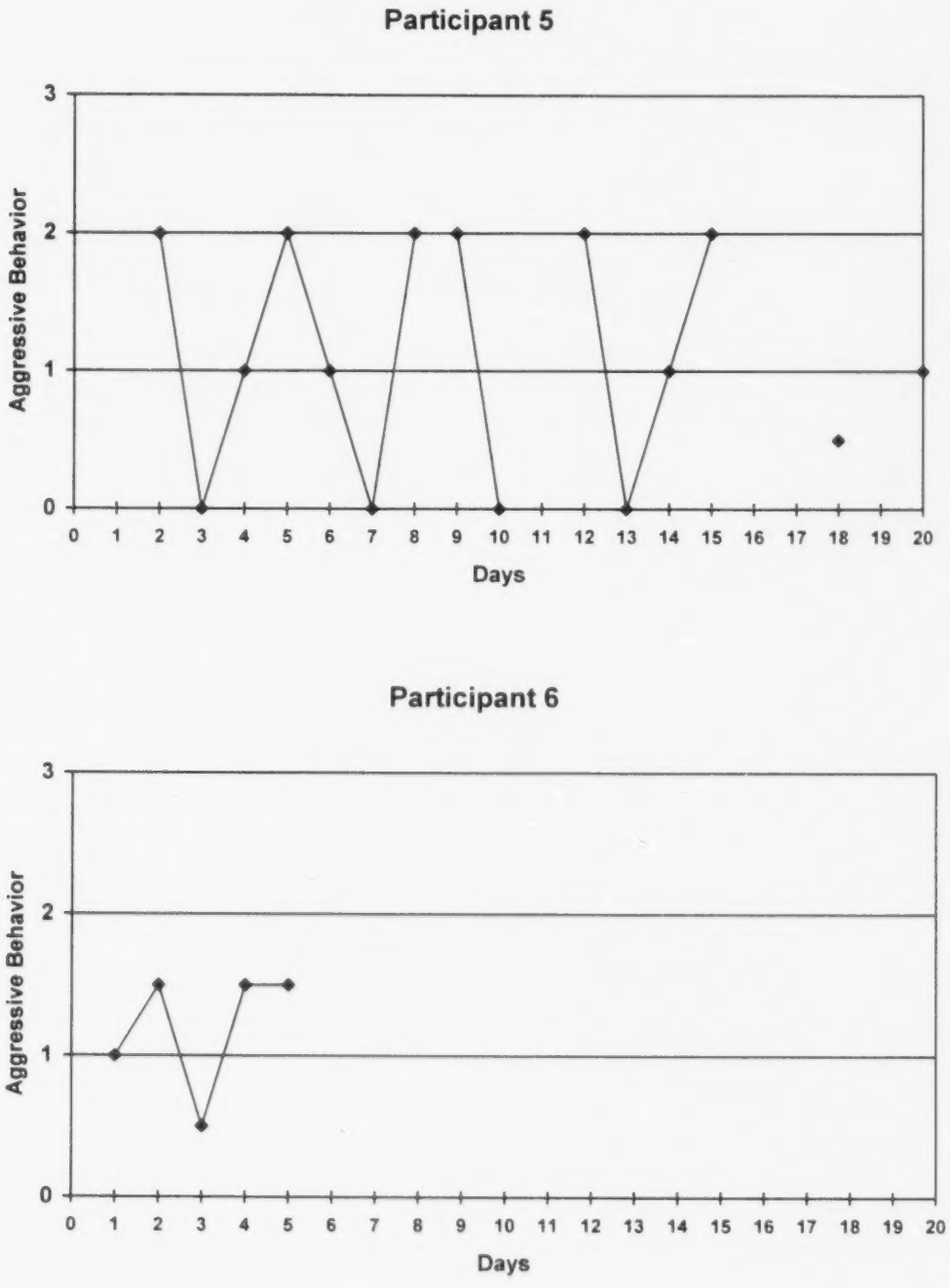


Figure 6. Mean number of aggressive episodes across baseline and intervention periods for subjects 5 and 6.

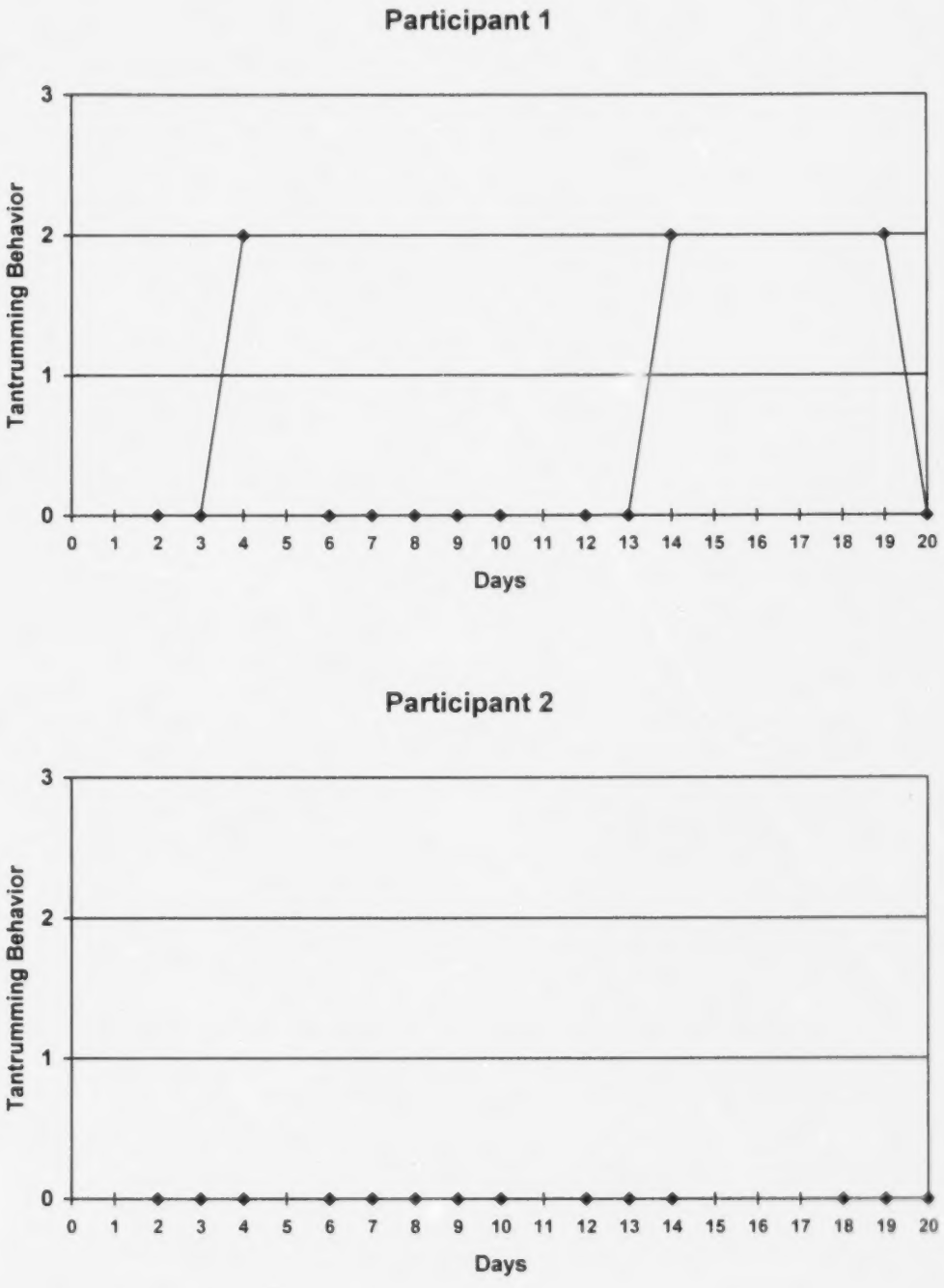


Figure 7. Mean number of trantrumming episodes across baseline and intervention periods for subjects 1 and 2.

demonstrate any episodes of tantrumming throughout the baseline (M = .00) or treatment periods (M = .00).

Figure 8 shows the tantrumming changes from baseline to treatment for subjects 3 and 4. For subject 3, the number of tantrums ranged from 0 to 2 in both periods and the mean number of tantrum episodes within the baseline period (M = .72) was nearly identical to that in the intervention period (M = .71). Similar findings were present for the fourth participant who had no tantrums throughout the study (baseline M = 0, intervention M = 0).

As with the aggressive behavior data, no data were available for participant 7 on the number of tantrumming episodes. Data for participants 5 and 6, however, are shown in Figure 9. For participant 5, the number of episodes of tantrumming decreased slightly from baseline (M = .75) to the intervention period (M = .58), but not dramatically. Only baseline data were available for participant 6, who evidenced a mean of .50 tantrumming episodes during this period.

H4: Analysis of ASL Sign Use

The next analysis was conducted to examine the extent to which participants were using the ASL signs during the baseline and intervention time periods. Figure 10 summarizes these data for participants 1 and 2. Both of these participants evidenced no sign use during the observed time periods, both before and after the introduction of the ASL

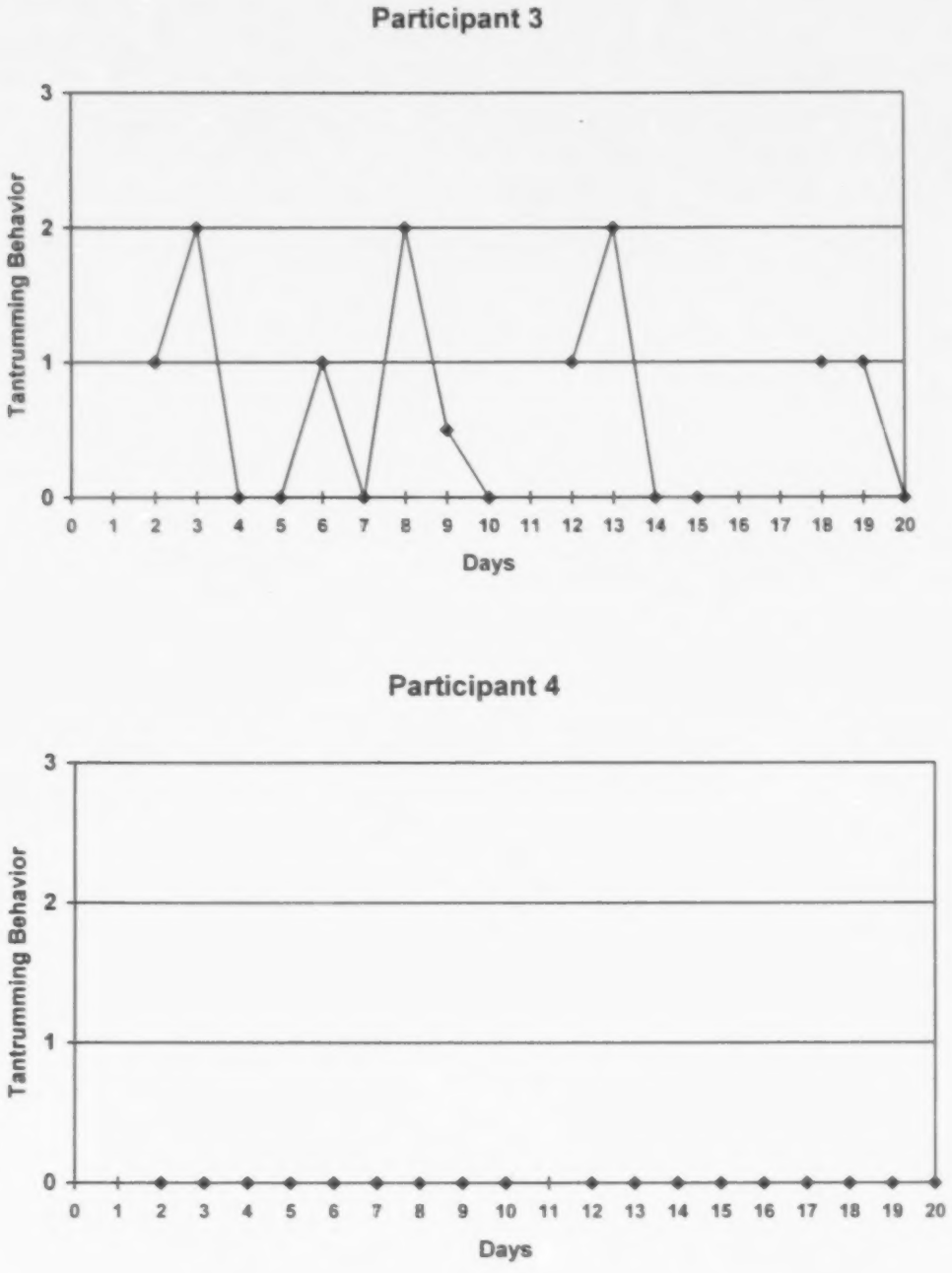


Figure 8. Mean number of trantrumming episodes across baseline and intervention periods for subjects 3 and 4.

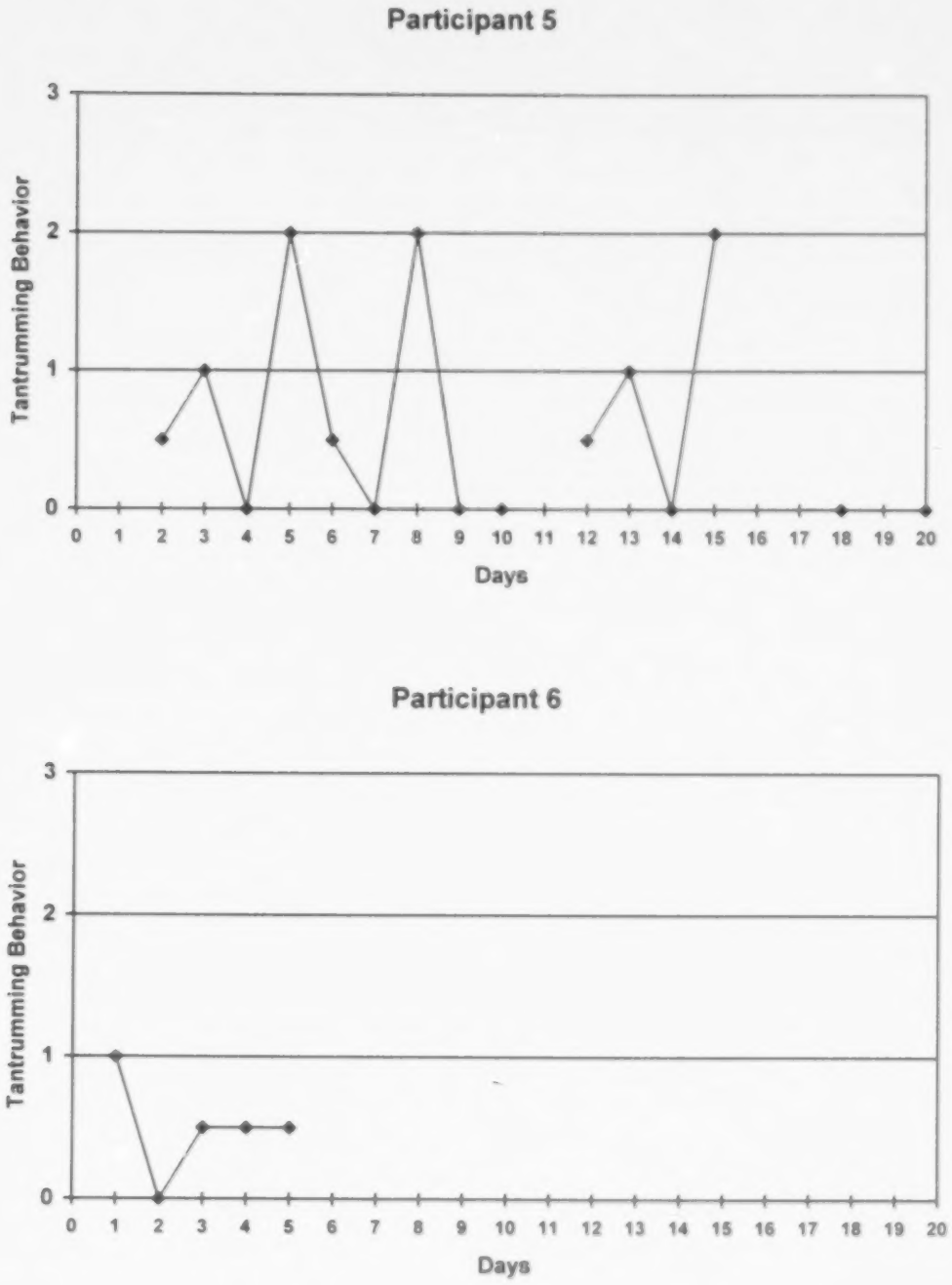


Figure 9. Mean number of trantrumming episodes across baseline and intervention periods for subjects 5 and 6.

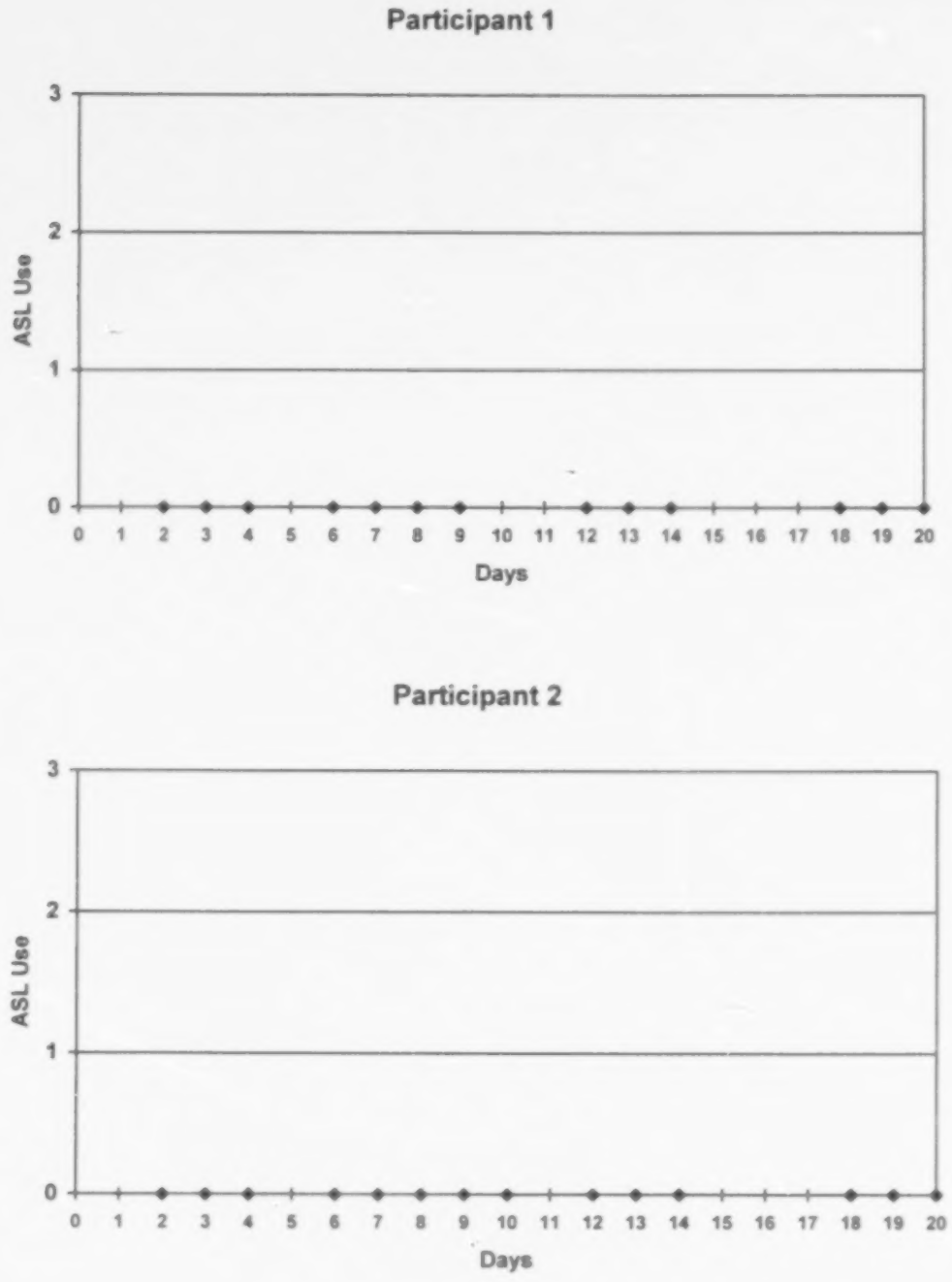


Figure 10. Mean number of ASL signs used across baseline and intervention periods for subjects 1 and 2.

intervention. Participants 3 and 4, however, did demonstrate an increase in the use of ASL signs from baseline, albeit these were relatively small increases (see Figure 11). Participant 3 went from a mean of .39 signs used per day to a mean of .86 signs and participant 4 went from a mean of .05 signs used during baseline to .21 in baseline. Participant 5 did not evidence much of a change in the number of signs used from baseline (M = .05) to the intervention period (M = .08). For participant 6 only baseline data were available (M = .40) (see Figure 12). No data were available for participant 7.

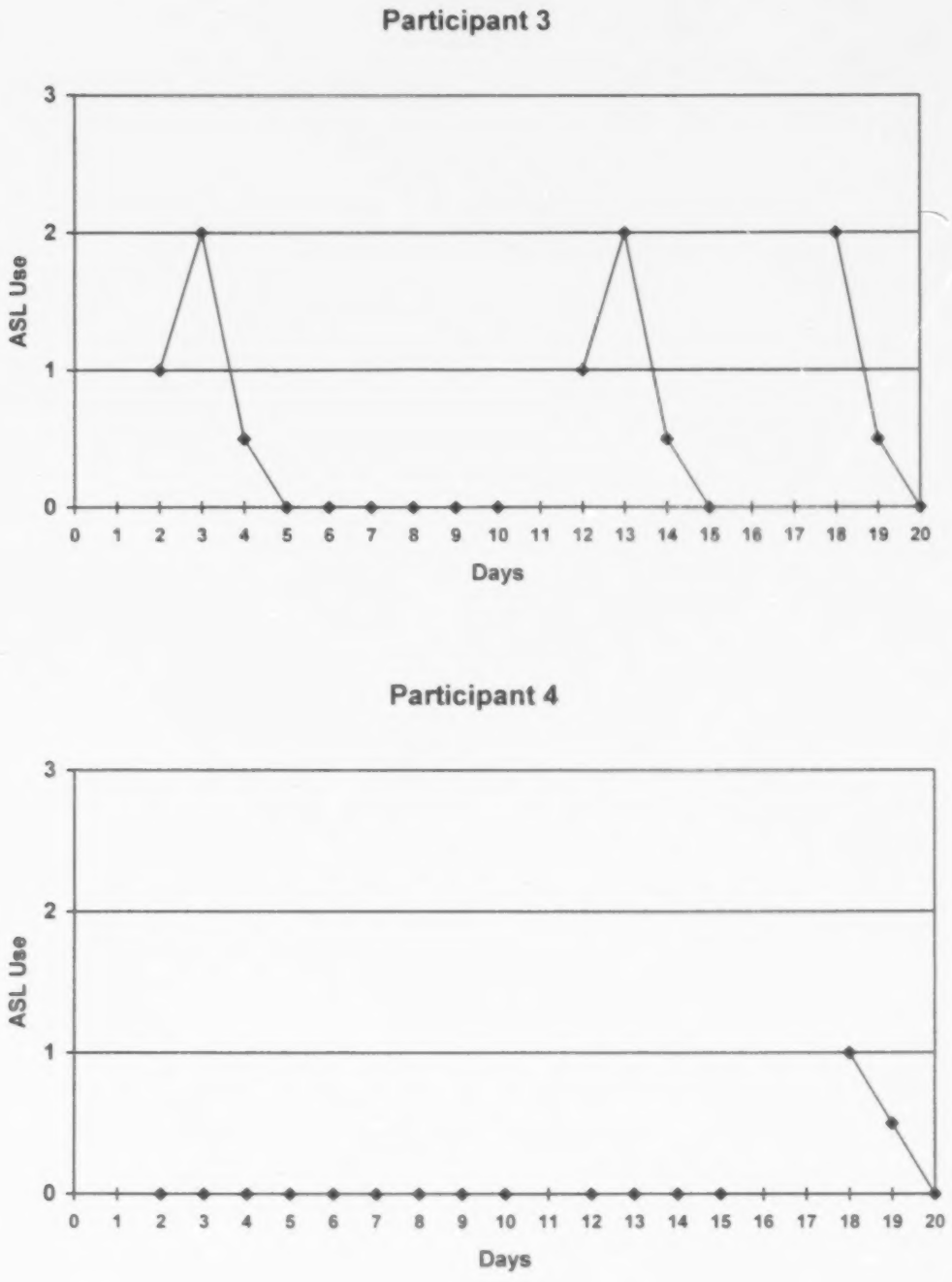
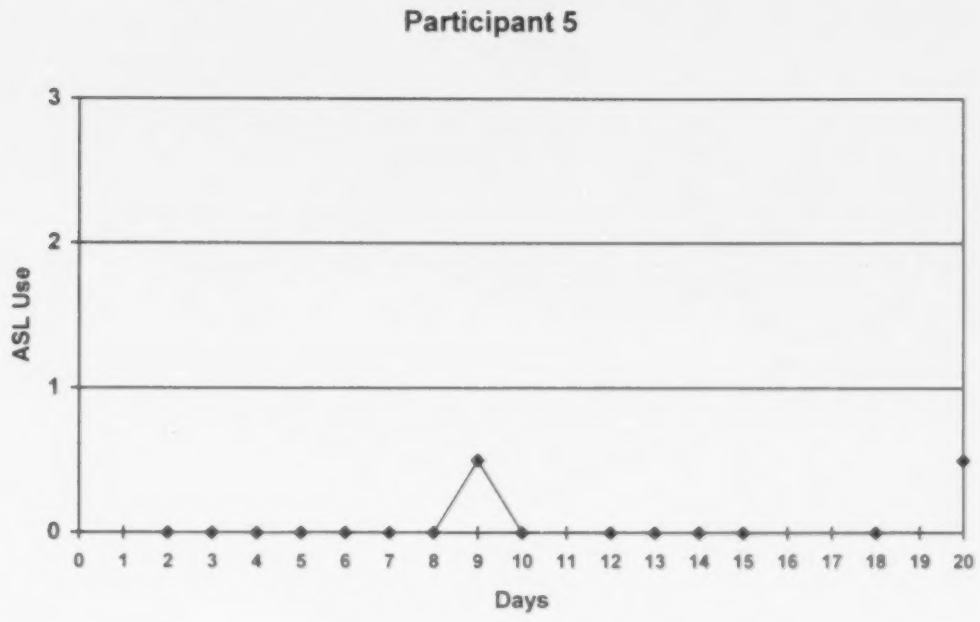


Figure 11. Mean number of ASL signs used across baseline and intervention periods for subjects 3 and 4.



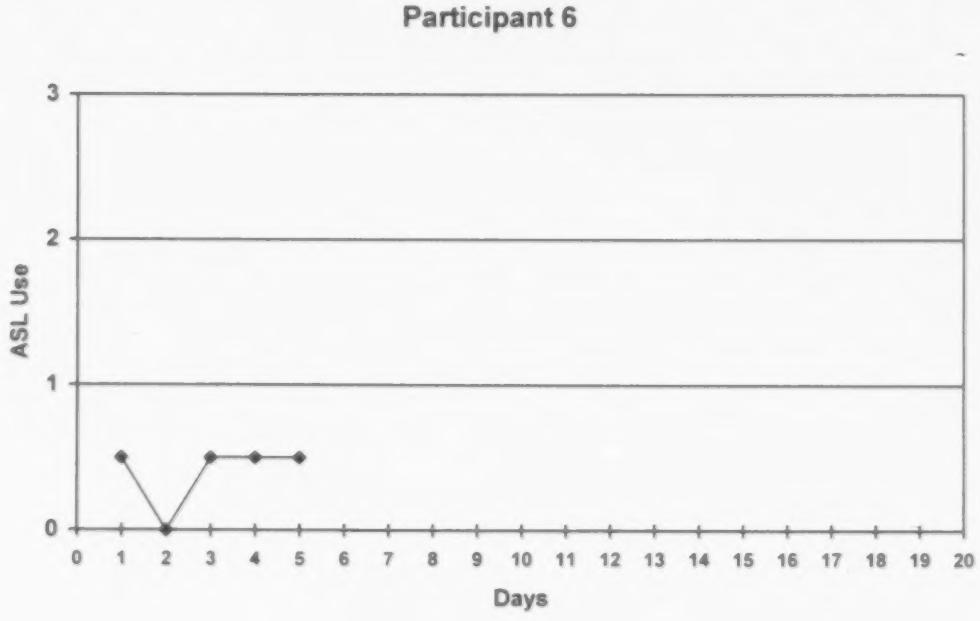


Figure 12. Mean number of ASL signs used across baseline and intervention periods for subjects 5 and 6.

CHAPTER IV

DISCUSSION

Summary of the Findings

This investigation was conducted to test the hypothesis that teaching children ASL signs could reduce the disruptive behavior of children with developmental disabilities and an associated communication disorder. It was anticipated that ASL would mediate language for these children to the point that the communication would replace previous negative behaviors that were functionally related to communication. Contrary to expectations, however, the data from this study did not support this position.

For the seven children who participated in the study, the baseline measurements of disruptive, aggressive, and tantrumming behaviors did not substantially decrease during the intervention phase. One explanation for these findings is that the actual number of ASL signs used also did not increase dramatically from the 2-week baseline period to the 2-week intervention period. This finding implies that the lack of effect could be related to the ASL sign intervention not being implemented appropriately. However, given that the measurement of sign usage was only for two half-hour periods each day, it is highly likely that the measurement was not inclusive enough to capture sign usage. Furthermore, there is a more compelling explanation for why this study did not

find that the use of signs reduced negative behavior in these children.

The most probable reason that this study failed to find results was that the ASL signing had already been implemented approximately 5 months before the onset of the baseline period. In designing this study, it was expected that the use of new and/or additional signs would create further behavioral improvements. This was obviously not the case. The fact that many of the children in this study had relatively few episodes of behavior problems during baseline is testimony to this interpretation. The level of behavior problems at baseline was considerably low, particularly in light of the severity of the participants who were selected for this study. Because of this confound, it may be too premature to conclude that language mediation through ASL signing does not improve behavior in developmentally disabled children. In fact, there was substantial qualitative evidence that the use of signs did have an impact on behavior.

When the investigator began the programs 5 months prior to implementing the study, the behavior of the children was extremely poor, much more so than it was at baseline. During this time, teachers were instructed by the investigator on the importance of language in the behavior problems and on how best to communicate with the children (e.g., using eye contact), including through the use of ASL signs. During the interim period up to the onset of the study there was a

noticeable decrease in behavior problems among the children. Both teachers and teachers' assistants reported noticing great changes in the behavior and communication skills of the children since the onset of ASL signs.

In particular, there was a noticeable change in classroom atmosphere after the signs were implemented, long before the baseline period began. Children were quieter and not as physical as they had been. Previously, children were frequently throwing things, kicking, and engaging in other disruptive behavior. There was also a change in exiting and boarding the bus to and from school in that the atmosphere was quieter and less chaotic. Before, fighting was frequent. Yet, after the ASL signs were introduced into the program there was no more fighting.

Behavioral improvements were also noticed at home before data collection had begun. Because the first participant loved receiving hugs but was nonverbal and never asked for them, one of the first signs he learned was how to ask for a hug. Soon after learning this sign, his teacher got a note from his mother stating that her child had shown her the hug sign, requesting a hug from her. Interestingly, the mother was not aware that her child was taught this sign but figured out what he wanted because of the obviousness of the sign. Prior to this, the child had never asked his mother for a hug. After learning signs, this child is now reported to be more content and independent by his teacher. Behavioral observations also indicate that he smiles more and

has become more socially interactive with both his teachers and classmates. Prior to the onset of the ASL signs, this child would sit in corner and would not interact with his peers, would not give eye contact, and would not ask for anything. Now, every time a person walks into class and greets him, he makes eye contact with them. Before the study, he began, for the first time, giving signs to communicate that he needed to go to the bathroom. In the past he would instead throw a tantrum when he needed to go to the bathroom. These behavioral improvements were all obtained by teaching the child three signs.

Before the onset of the signs 5 months prior to the study, the second participant would engage in major tantrumming behavior by refusing to eat her breakfast, throwing her breakfast over herself and others, pulling, pinching, engaging in screaming fits, and banging. The behavior frequently got so out of control that she had to be physically removed from class. This child also refused to learn from the ABA adaptive skills and could not dress herself and was not toilet trained. After she was taught ASL signs, the majority of the time she would eat her cereal, when before she would have to be force-fed. Although this child now says hello to a staff member when she previously did not greet anybody, her tantrumming did not improve when she wanted something and neither did stemming (i.e., touching herself). Here behavioral improvement occurred by learning just four signs, all of which were functional.

Before learning signs, participant 3 would pull hair, pinch, and throw chairs or anything that was nearby. Her behavior was so out of control that she had to be put in a restraint chair. This child would also not respond when spoken to. After learning ASL signs, this child would stop her behavior in response to the "don't" command. She remains nonverbal, but she signs frequently and she is more attentive and gives more eye contact than was evidenced previously. Her behavior changes occurred from learning four signs.

The fourth participant also demonstrated substantial improvements in his behavior since the signs were first introduced before the onset of the study. Before signing was taught, this child would refuse to get up and staff would have to pick him up under the armpits. Although this child smiled frequently and had a good disposition, he would frequently throw chairs and food. At first, teachers believed that signing was not possible with this child because of his lack of fine and gross motor skills. He was taught five signs before the onset of the study and several behavioral improvements were evident. In past, this child would smile but not acknowledge [illegible], but after signing he would look up at the person and verbalize the acknowledgement by saying, "hi". At the onset of the study he was making eye contact and was responding to the command "no".

The fifth participant made considerable improvements once the ASL signs were introduced prior to the study.

Before signs were introduced, this child had to be physically taken off of the bus, he would thrash around, throw himself on ground, scream, kick, and had to be dragged into school. His tantrums were frequent and he would blow his nose into his hands and smear it over others to get people to not interact with him. He would also frequently throw food. After learning 15 signs before the study, his behavior remarkably improved. He ceased most all of his disruptive behavior and by the baseline period has increased eye contact and communicate his needs through the use of his increased sign language vocabulary. As a result, his behavior and attention span had increased.

Participant 6 also evidenced dramatic improvements in her behavior. Although this child did not sign accurately, in that she approximated a sign rather than give the exact sign, her level of communication has increased. Instead of throwing things, screaming, and becoming agitated as she did before signing was implemented, she gave brief eye contact and a sign. Before signing was introduced, there was difficulty with getting her to stand up on command. Through the use of signs, this problem has decreased tremendously. In the past she also had to be carried off the bus; she banged her head, screamed, and would scratch herself until she bled. After learning 10 signs before the onset of the study, her behavior was more in control and fewer of these episodes occurred.

When participant 7 began to learn ASL (before the onset

of the study), his whole world seemed to open up. Yet, this was not reflected because of the changes prior to baseline and due to the fact that the teacher did not provide data on this child during the intervention period. Several months afterward, this child was introduced to signing; he was no longer having tantrums with the same intensity that he did previously; instead, he would try to communicate his concerns. In contrast to his behavior before ASL signs were implemented, at the baseline period this participant knew how to ask the teacher for something he wanted, whether by signing or gesturing. He smiled more frequently than in the past and became more socially interactive with his classmates. Behavioral observations of this child indicate that he now points, gestures, motions his teacher, hold hands her hand and show her what he wants. Consequently, the frequency and intensity of his tantrums have dramatically decreased. Before the onset of the study he knew three signs.

Although these anecdotal reports offer promise
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undoubtedly weakened the effects of the intervention. Additionally, it is reasonable to suspect that teachers were somewhat unreliable in their reports of participants' behaviors.

Despite attempts to persuade teachers otherwise, it was apparent that some teachers were not in favor of using signs with hearing children. These teachers held firmly to the belief that ASL signs were for deaf or hearing-impaired children only. It was clear that certain teachers had strong attitudes toward specific children about what would help them learn. In fact, it is interesting to observe that the children who did not do as well were not hearing impaired. Thus, it is very likely that teachers' expectations influenced the treatment. The teachers who held these beliefs appeared to engage in a nonsystematic, haphazard approach to teaching the signs. The importance of teacher attitude on the results was evident in the fact that the children who did the best (participants 6 and 7) had a teacher who was hard of hearing and who therefore emphasized signing.

These teachers' beliefs, however, are not uncommon and represent a long debate about teaching hearing children sign language. The crux of this debate is that teaching children who are not hard of hearing sign language will impede their voicing ability. Yet, the evidence against it has steadily weakened this argument. In fact, research in this area demonstrates that teaching sign actually enhances

communication; it does not truncate it (Acredolo & Goodwyn, 1993).

Language development progresses normally. Before age 2, there is no vocal cord coordination. Before that, the child learns to do various behaviors in order to communicate, such as engage in tantrums. Later on children naturally drop signs and will begin vocalization because they have natural language ability built in. In this model, sign language works like a child uses training wheels on a bicycle. It assists the child in refining his natural skills and after awhile becomes unnecessary.

Evidence for this position comes from research conducted by Garcia (1999) who works with infants 8 to 10 months old. His research indicates that children naturally drop signs once they have the verbal skills available to communicate their message. Acredolo and Goodwyn (1993), who also recommend signing with hearing infants and children, report similar success. In their longitudinal study of 140 families, these authors report that that, in contrast to non-signing babies, babies who were taught ASL signs had greater vocabularies, greater word comprehension, and scored higher on intelligence tests when tested years later; children who signed as babies had a mean IQ of 114 (High Average) and non-signing children had a mean IQ of 102 (Average). Signing babies were also reported to engage in more sophisticated play than babies who were not taught signing. Additionally, parents of signing babies reported that their babies'

frustration levels had decreased and their frequency of communication increased. Parents also reported an enriched bond with their infants and that they had increased interest in books. Research by Hirsh-Pacek, Golinkoff, and Hollich (1999) also indicates that when you give children sign language, bonding is increased. Thus, the growing evidence supports the facilitative use of teaching ASL to hearing infants and children.

It is also important to recognize that the findings in this study may have been affected by the teachers' failure to perceive behavior as being worthy as being recorded due to the fact that they were so used to seeing the child behaving worse. Undoubtedly, this study would have also been improved by using longer baseline and intervention periods.

Additionally, as was discussed earlier, one of the biggest problems in this investigation was gaining the compliance of the teachers who were responsible for implementing the treatment. This was not surprising given that much resistance to change has been noted with the majority of teachers (Gitlin & Margonis, 1995). Despite all the archetypes for restructuring and the research data, faculty members tend to question the reason for change (1995).

Given this, individuals attempting to replicate the present investigation should heed the advice of Chesley and Jordan (1996), who advise that school change must begin with efforts to help staff members see the opportunity for renewal

by building their trust and including their ideas in the plan for change. According to these authors, a new and/or redefined vision can come as a result of listening to the faculty talk about their rationale for change, presenting them with open-ended questions that lead to the venting of frustrations, the identification of the schools strengths and weaknesses, the enumeration of real or imagined constraints, and a clear expression of hope for the future. Empirical evidence argues that the emphasis within the tradition on promoting teacher engagement in school change discounts the potential good sense embodied in teachers' resistance to innovation (Gitlin & Margonis, 1995). Implementing any new program, including a program that uses ASL signing as an intervention, must take into account the long history of teachers' resistance in order to avoid the push-pull cycle, which leaves schools fundamentally unchanged. Efforts to making changes require treating teachers with respect, sharing information, giving and receiving feedback, using confrontation skills effectively, and employing leadership shills (Margolis, 1991). The key to the success in implementing an ASL program will be to focus on the human side of change and to rethink the essentials of leadership (Evans, 1993).

Transformation is always on the school agenda. Radical changes in curriculum, and in relationships between teachers, students, and administration and parents have occurred in recent years (Walley, 1995). School restructuring must be

based on a cooperative relationship among teachers, students, administrators, and parents. Efforts to include all members of the community have resulted in ultimate benefit for children, teachers, and families involved (Romberg & Price, 1983). Change has meant redefining roles and expectations that naturally lead to some people feeling uncomfortable or threatened. Ignoring or neglecting the emotional fallout of change may sabotage success of any study that seeks to further examine ASL interventions in the developmentally delayed population (Marshak, 1996). School changes are all too often focused on the external, rational, and technical elements of the process. Thus, schools too frequently neglect to acknowledge the emotional experience of teachers and administrators that interplay with resistance, loss, and grief. Resistance may sometimes be the result of a teacher's inability to communicate openly, freely, and safely (Marshak, 1996).

In sum, in order to most effectively evaluate the efficacy of an ASL intervention in a school setting, investigators will need to go beyond the mere mechanics of implementing the intervention. Any evaluation of an ASL intervention must place a strong emphasis on managing the change process that is required to implement the school. Thus, the ability to adequately examine the efficacy of these types of interventions relies heavily on the researcher's ability to get teachers to fully commit to the implementing the intervention.

Implications

Although this study did not provide hard evidence for the efficacy of using ASL with the developmentally disabled population, there was enough anecdotal evidence to consider applying this intervention. The advantage of ASL is that, even if it is not effective, the iatrogenic effects of using it are minimal, at most. The findings from this study would imply that, when done effectively, professionals, parents, and caretakers who take the time to implement ASL signs into the behavioral repertoire of the children will see dramatic improvements in the child's behavior.

This study also demonstrated the difficulties in implementing such an intervention. Individuals' biases regarding teaching signs to hearing children will need to be changed before any positive treatment gains can be expected. In this study, passive discussion about the applicability of signing to hearing-impaired children was not enough to change teacher attitudes. This implies that active, hands on training might be useful in changing these attitudes.

Directions for Future Research

This study was a first step toward better understanding of the utility of teaching ASL signs to developmentally disabled children in changing problematic behavior. Future research in this area should begin by utilizing better methodology than what was used in the present study. Although the multiple baseline design is appropriate for studying this topic, future studies should use children who

have had no exposure to sign language. This was a major drawback of the present study and one that most likely contributed to the lack of significant findings.

Aside from replicating the current investigation, there is a large body of work to be done to better understand the optimal uses for signing. Studies in this area may explore the differential applicability of signs on different populations and different target behaviors. It is quite possible that signing works best with some issues and is less effective with others. Identifying these areas will be an important contribution to the application of an ASL signing intervention.

Because the present study used signing in conjunction with the ABA behavioral intervention, its effects without this intervention remains unknown. Future investigations should examine the use of signs separate from any behavioral investigation.

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APPENDICES

APPENDIX A

BEHAVIOR RATING SCALE

BEHAVIOR RATING SCALE
(Baseline)

Name: Charlie

0= NO EPISODES
1= 1-2 EPISODES
2= 2-MORE EPISODES

	AGGRESSIVE BEHAVIOR Stemming Throws chairs Pulls hair Pulls eye-glasses	TANTRUMMING Screaming Throwing self on floor Turning over furniture Crying hysterically	ASL SIGNS USED Eat Drink Toilette More Thank You
Monday			
AM: 10;00 TO 10:30	0 1 2	0 1 2	0 1 2
PM: 1:00 TO 1:30	0 1 2	0 1 2	0 1 2
Tuesday			
AM: 9:00 TO 9:330	0 1 2	0 1 2	0 1 2
PM: 12:00 TO 12:30	0 1 2	0 1 2	0 1 2
Wednesday			
AM: 9:30 TO 10:00	0 1 2	0 1 2	0 1 2
PM: 1:30 TO 2:00	0 1 2	0 1 2	0 1 2
Thursday			
AM: 10:30 TO 11:00	0 1 2	0 1 2	0 1 2
PM: 12:30 TO 1:00	0 1 2	0 1 2	0 1 2
Friday			
AM: 11:00 TO 11:30	0 1 2	0 1 2	0 1 2
PM: 11:30 TO 12:00	0 1 2	0 1 2	0 1 2

BEST COPY AVAILABLE

APPENDIX B

STUDENT BEHAVIOR RATING SCALE

STUDENT'S BEHAVIOR RATING SCALE (End of each day)

Please rate the student's behavior on the following items

Name: Dovie

	NOT DISRUPTIVE (1 OR 2 SPORADIC EPISODES)		SOMETIME DISRUPTIVE (3 TO 4 EPISODES)		VERY DISRUPTIVE (not 1 hr. went by without an episode)	
Day 1	1	2	3	4	5	6
Day 2	1	2	3	4	5	6
Day 3	1	2	3	4	5	6
Day 4	1	2	3	4	5	6
Day 5	1	2	3	4	5	6
Day 6	1	2	3	4	5	6
Day 7	1	2	3	4	5	6
Day 8	1	2	3	4	5	6
Day 9	1	2	3	4	5	6
Day 10	1	2	3	4	5	6